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THE TOOL ENGINEER

OFFICIAL PUBLICATION OF THE ASTE AMERICAN SOCIETY OF TOOL ENGINEERS

Perishable Tools on the Firing Line — by W. L. Johnson

"Engineering" a Tool Engineering Curriculum — by Sherman B. Hogberg

Elements of Pneumatic Installation — by Joseph C. Comer

Tooling a Loaf of Bread — by Andrew E. Rylander

Simple and Compound Hydraulic Circuits — by Fred C. Hobert

Machine Tool Lubrication — by William H. Oldacre

Nylon and Two Stage Accuracy — by Arthur A. Nichols

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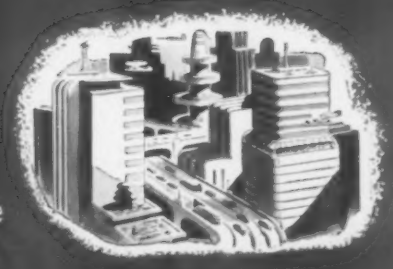
Fundamentals of Tool Engineering
Tools of Today
Departments
A.S.T.E. News
Telegrams
Gadgets



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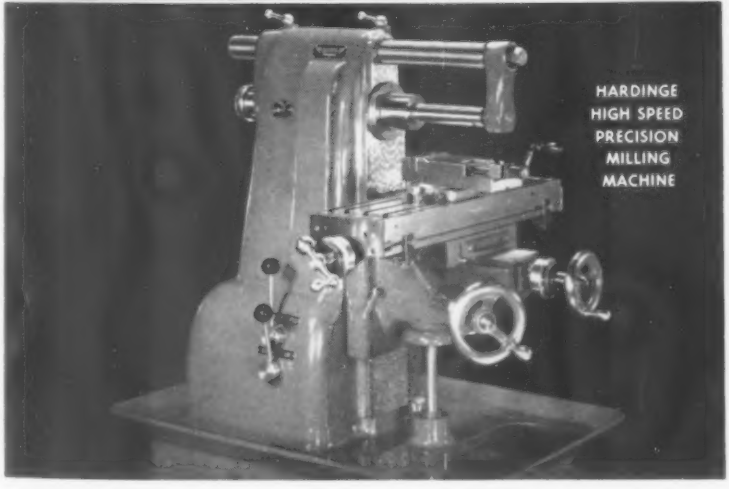

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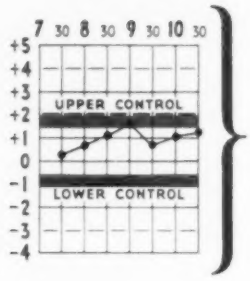

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As a result of the Society's hearing in April before the Appeal Board of WPB, *The Tool Engineer* was granted a magazine paper quota, permitting us again to accept advertising. This issue is a gratifying testimonial of the industry's faith and support of the Society's editorial and educational programs. Although advertisers were seriously handicapped when the Society was forced to interrupt their schedules, virtually every original advertiser in *The Tool Engineer* immediately reinstated his advertising in the Society's publication.

The Tool Engineer is published monthly at 1666 Penobscot Building, Detroit 26, Michigan, in the interest of the members of the American Society of Tool Engineers. Subscription is $2.00 per year. Non-members $6.00 per year. Application for Second Class Permit pending at Detroit, Michigan.

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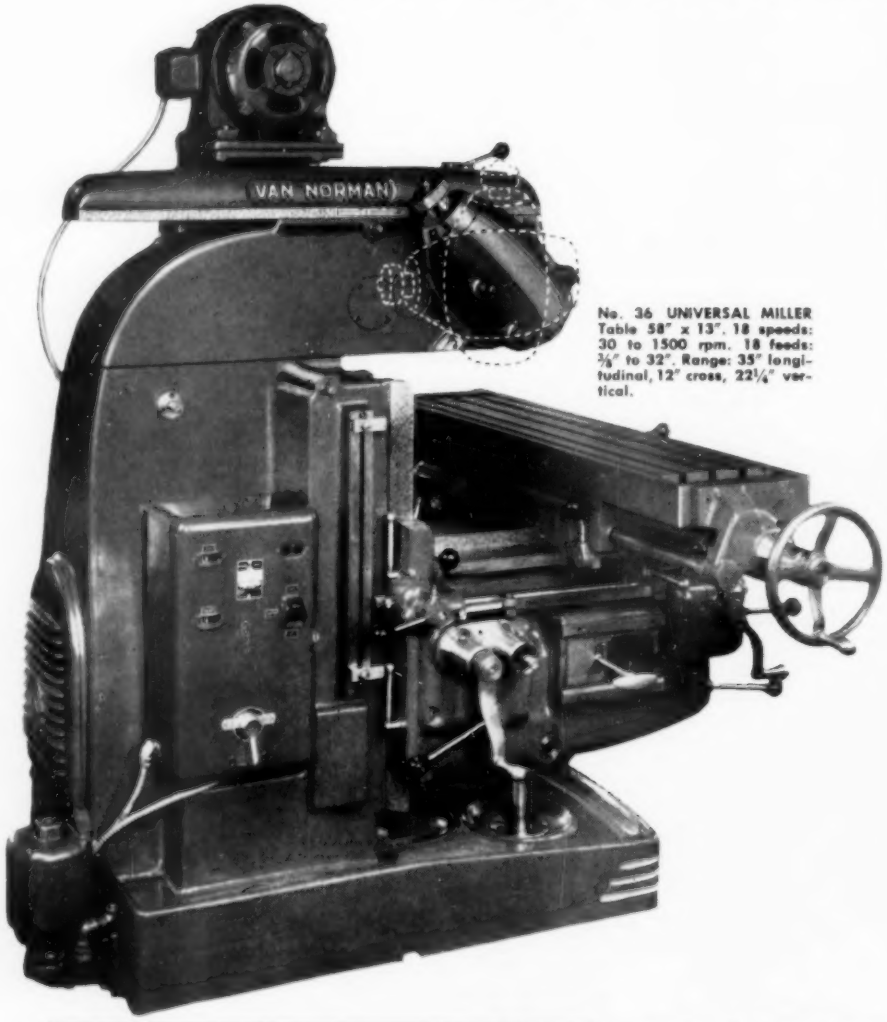
That Vulcan Tool Company or any other specialist blankets that definition in every instance is too much to claim, but the reason we have hit the bullseye so often is because we *never fail to aim for it.*

The VULCAN TOOL Co.

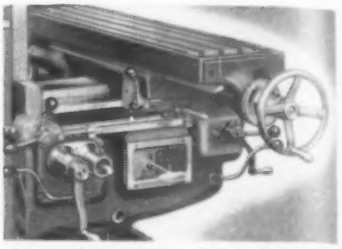
213 NORTH BECKEL STREET DAYTON 3 OHIO

NO OPERATOR "Dead Spots" IN VAN NORMAN

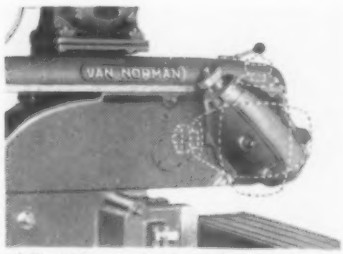
RAM-TYPE UNIVERSAL MILLERS



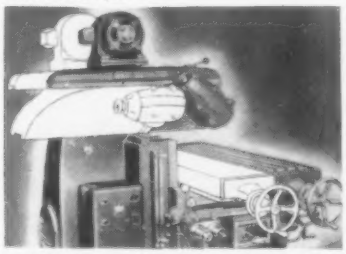
No. 36 UNIVERSAL MILLER Table 58" x 13". 18 speeds: 30 to 1500 rpm. 18 feeds: ⅜" to 32". Range: 35" longitudinal, 12" cross, 22¼" vertical.



Front and Rear control of both hand and power feeds gives operator complete control of milling operations from either location.



Adjustable cutterhead permits vertical . . . horizontal . . . or angular milling all on one machine — gives you the work range of several types of millers . . . greatly reduces work reset-ups.



Adjustable cutterhead and movable ram in combination with the saddle cross feed provides maximum milling capacity and versatility.

1. **Front and Rear operation of manual and power feed controls**
2. **Adjustable cutterhead gives vertical, horizontal and angular milling**
3. **Movable Ram provides increased work capacity**

Whether the operator is at the front or rear of the machine, he always has complete control of a job on Van Norman Ram-type Millers. Why? Because all feed controls — manual or power — are located in both the front and rear of the machine. This means that there is no more running from front to back or vice versa to line up work for the cut. It means complete visibility of the cutting operation no matter in what position the operator stands. Result — no back and forth steps . . . minimum worker fatigue . . . and most important, accurate work with minimum rejects.

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3 Good Reasons why you'll like this New Norton Vitrified Bonded* Diamond Wheel

for Grinding Chip Breakers

1. Holds Its Corner—Much of the ability of the Norton Vitrified Bonded Diamond Wheel to show such amazing life is due to the way that the corners stand up. Even in the hands of inexperienced operators this wheel holds a sharp corner and does not require the frequent trueings that shorten life.

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Try this wheel on your chip breaker grinding. Contact your Norton abrasive engineer or your Norton distributor.

NORTON COMPANY
WORCESTER 6, MASS.

* Patented

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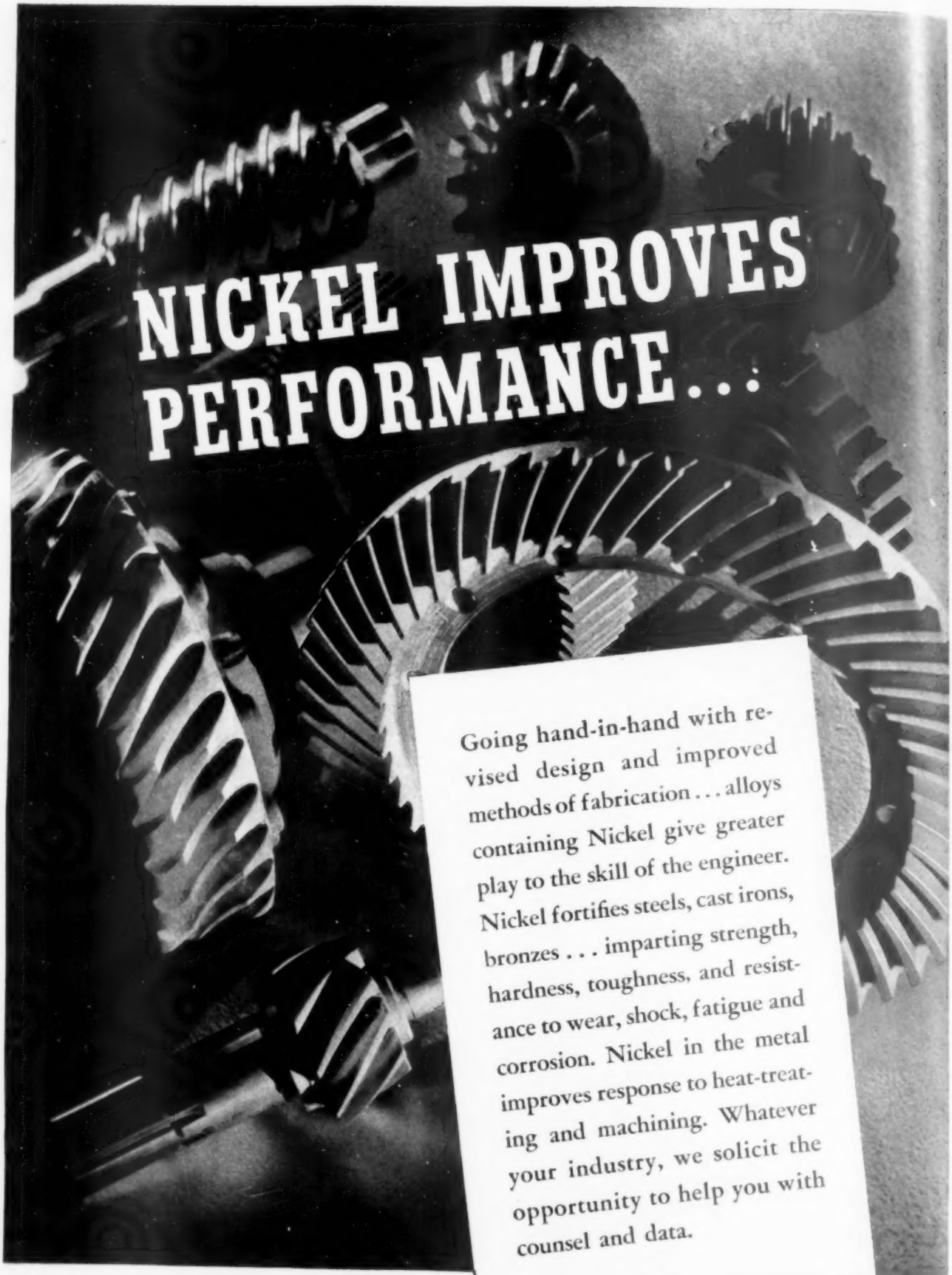
NORTON ABRASIVES



Going hand-in-hand with revised design and improved methods of fabrication . . . alloys containing Nickel give greater play to the skill of the engineer. Nickel fortifies steels, cast irons, bronzes . . . imparting strength, hardness, toughness, and resistance to wear, shock, fatigue and corrosion. Nickel in the metal improves response to heat-treating and machining. Whatever your industry, we solicit the opportunity to help you with counsel and data.

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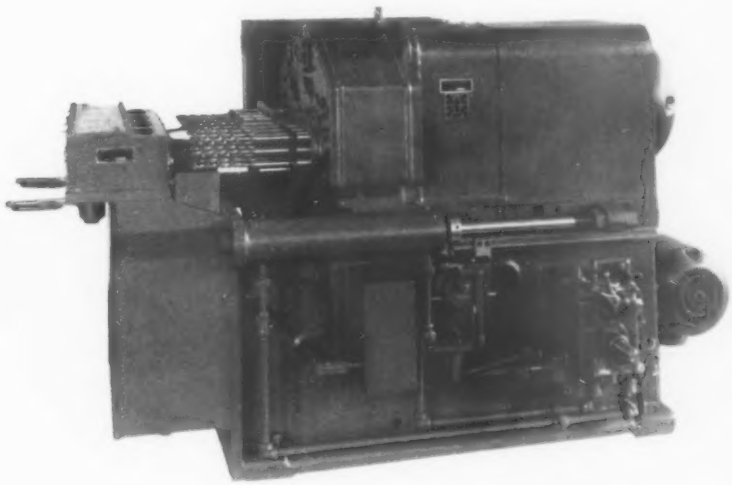
designed for Greater Production

FASTER PRODUCTION, close work, and lower manufacturing costs—goal of all tool and production engineers—can be achieved by engineering BAKER BROTHERS production machines to fit *your* needs. Our engineers will be glad to co-operate in working out your machining problems.



This unit type one-way horizontal multiple drilling machine was furnished a well known automobile manufacturer for multiple or gang drilling of engine main bearing caps.

Heavy duty fixed center 16-spindle multiple head is direct driven by simplified drive from main motor mounted on the saddle.

Quick loading and unloading fixture at left is conveniently located so that operator standing at left can unload and reload a complete set of caps quickly and without over-reaching.

Unit bed has 20-in. width of ways and 40-in. length of saddle. Hydraulic feed is designed for rapid traverse, automatic engagement into feed, automatic tripping at depth, and return of complete head and rapid traverse feed to rear position.

Hydraulic cylinders, one on each side of the saddle, are out in the open, permitting quick adjustment of glands in the event of any oil leakage around piston rods.

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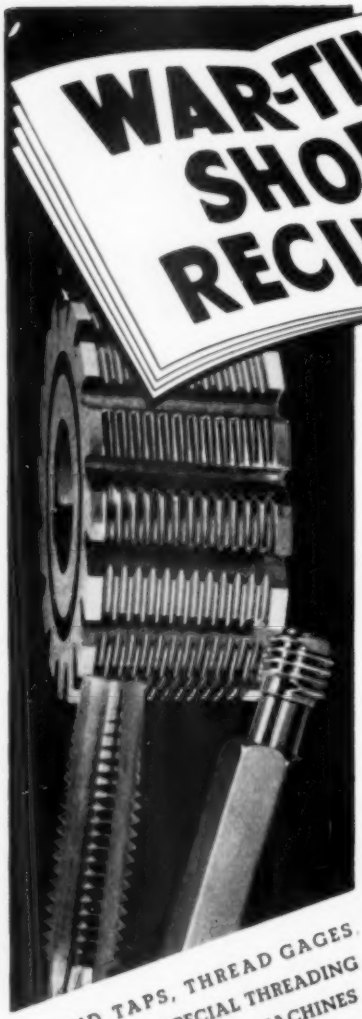

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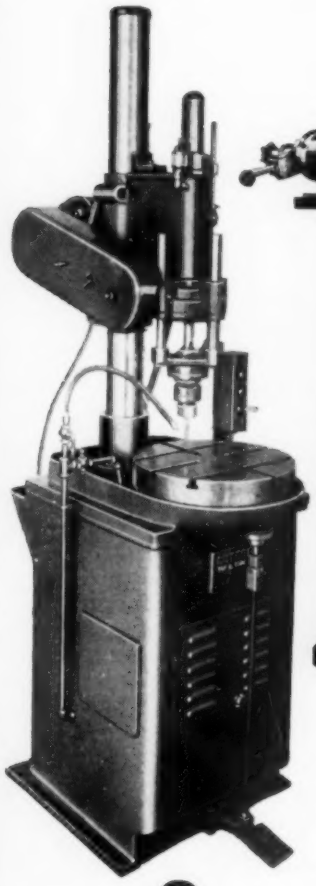

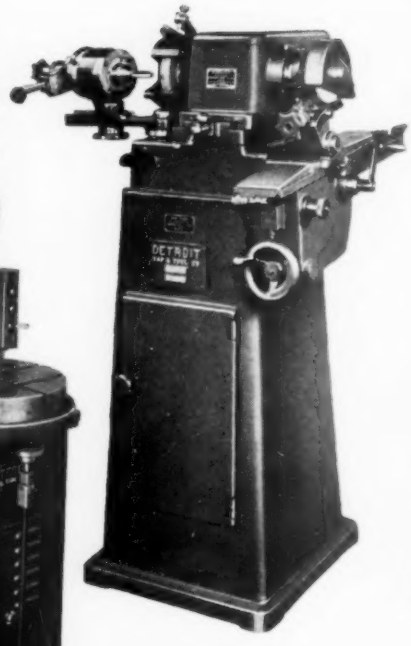

2

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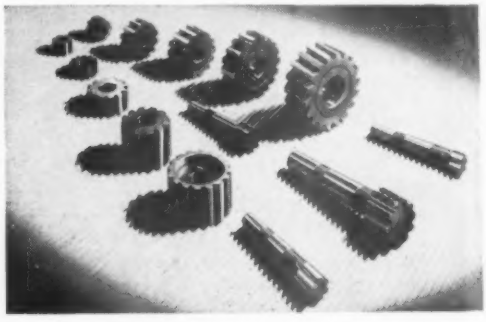

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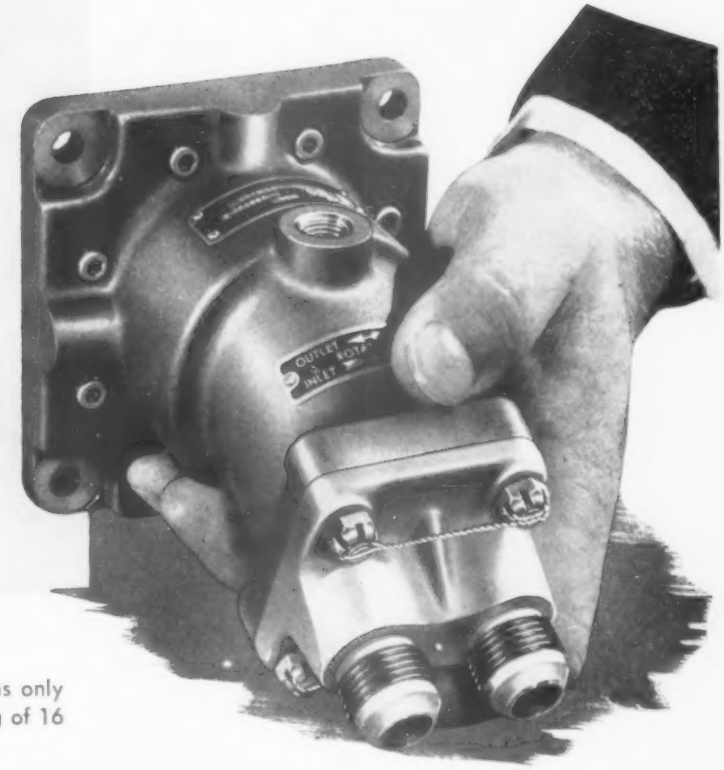

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THIS YEAR AND THE YEARS AHEAD

IT IS well, at the start of our new administration, to give the A.S.T.E. membership at large a broad, general outline of the policy we hope to pursue. The general plan has been determined and agreed to by the entire group of elected and appointed officers. Each officer has pledged his support. This procedure permits us, perhaps for the first time, to formulate a program for a period longer than just one fleeting year.

One drawback to our Society's progress in the past has been the lack of a long-term, forward-looking policy. That was natural. A group of officers was installed for one year only. It was just not possible to plan ahead. We hope these men now elected will be continued in office until our Society's objectives have been reached.

We approach this task of coordinating Society activities and expanding Society services with a feeling of deep humility, yet also with a certain degree of confidence. Humility, because we are fully aware of our heavy responsibilities, and confidence because we know that our horizons are limited only by our vision.

The tool engineer, as an individual, has progressed far in recent years. Within the past decade, and particularly since Pearl Harbor, we have seen a complete change in the attitude of industry toward the tool engineer.

Just a few years ago the tool engineer was given a completed product design and a modest appropriation for tooling up for production. At best, this appropriation was barely sufficient to cover the cost of the jigs, fixtures and accessories required to adapt standard machine tools for the new production job, and perhaps for the purchase of a few new machine tools of standard type.

In the last few years we have seen a considerable change—a bigger and more far-reaching change, I believe, than many of us realize. Today more and more tool enigneers are designing special single purpose machine tools to meet their own requirements, and the machine tool builder is working to the tool engineer's design.

Now an even more important development is getting under way. More and more frequently the tool engineer is being called in during the product design and development, and any suggestions he offers for design changes to facilitate production and reduce cost are given full consideration.

For some of this change in attitude towards the tool engineer, certainly, your Society deserves credit. But have we, as a Society, kept pace with the tool engineer as an individual who is definitely on his way up? Have we given him the support to which he should be entitled from his professional organization? In the next few years *we are certainly going to try.*

Work of the Organization Progress Committee brought to light certain weaknesses in our structure. *These we will work to correct this year.*

This Committee found, for example, that somehow, somewhere down the years, we as a Society had lost or mislaid many of the ideas and ideals of our founders. Our principal function should be to educate and promote the status of the tool engineer in industry. Our education and promotion program, inactive for several years, has been revived and reinvigorated, and *will be prosecuted energetically by this administration.*

Another weakness discovered by this Committee was a woeful lack of contact between the various units of our Society, between the Headquarters Office and the local Chapters, and between the officers and the individual members. Through organizational work, which several Chapters have already inaugurated, *we will work to correct this.*

The Committee learned also that dissatisfactions and complaints, while numerous and justified, were invariably due to misunderstandings engendered by a lack of information. Through the medium of *The Tool Engineer*, which we now own and control, and through the use of frequent reports to the membership, *we will work to eliminate this fault.*

Analyses by the newly created Finance Committee, which, incidentally, is now a permanent group, show a financial structure which requires immediate attention. If further study shows that drastic measures are needed, *those drastic measures will be taken.*

We are pledged, as a group, to a policy of building a firm foundation on which our Society may operate. We believe that the financial structure must be so built that our Society will support its activities from dues paid by members. Other possible revenue-producing ventures such as the Handbook, the magazine, shows and exhibits, are too uncertain, particularly at this time, to justify our relying heavily upon them.

The building of a solid financial foundation we believe to be our first duty.

This, then, is our program.

We believe that the desired and necessary continuity in policy can be achieved, without constitutional change, by promoting senior officers year by year instead of electing an entirely new group each year. Retirement of the president and selection of competent replacement officers would insure the injection of "new blood" every year.

Under this program, our time and energies will be devoted to the consolidation of our present position and to bringing the projects already started to a successful conclusion. We have in mind some far-reaching and perhaps visionary ideas of service which we can render to our membership and to industry at large. But certainly, we must put our own house in order first. Only when our financial structure is on a firm foundation and our primary activities are operating smoothly, will it be advisable to consider expansion into new fields.

Success of this program depends upon your support. Without your backing, we as officers and directors will be helpless. No matter how hard we work, without you those efforts will be futile. With you, the individual member, supporting and helping us there isn't anything in the world that can stop the American Society of Tool Engineers from taking a high and honored place in the councils of industry, the state and the nation.

C. V. BRINER,
President, 1945-46

By Andrew E. Rylander

Tooling a Loaf of Bread

Automatic equipment assures cleanliness, uniformity and minimum cost in producing the "Staff of Life"

OLD AS THE art of bread-making is, it remained a more or less hit and miss affair until the advent of the steam oven, late in the 19th century, and the more recent thermostatic control. The earliest "oven" was a flat stone, on which a fire had been built; later this was roofed over with stones and sealed with clay.

In colonial times, the housewife baked in a huge oven adjacent to a fireplace, and on a larger scale, the brick oven prevailed in the public bake shops. A fire was first laid in the vault; then, when the ashes were swept out, the loaves were introduced, and later removed, by long handled "peels."

The result was a consistent lack of uniformity in the baked product. When the oven was hottest, as at the beginning, the bread might be heavily crusted, with the inside doughy—that is, unless one preferred a burnt crust and digestible interior. Then, as the oven progressively cooled, there would be an interval of "slow" baking with the final batch of somewhat questionable consistency.

This method of baking—although the cast iron range eventually superseded the brick oven—prevailed until recent times. For that matter, most of the bread in the United States was baked in the homes up to and including the time of the first world war.

Cleanliness a Recent Development

For thousands of years, dough was laboriously kneaded by hand, or, in public bakeries, by treading with the feet! Of course, the bread was *sterilized* during baking, to be further contaminated during subsequent handling. But then, people weren't so germ conscious in the early days. They either died young, as a result of accident or from causes unknown, or lived to a ripe old age regardless of germs.

In the modern "automatic" bakery, handling is ultra-efficient and sanitation is insured by every means known to modern science. Here, the processing of bread may be divided into five major sections: flour handling; dough making; loaf making; baking and, finally, slicing and wrapping. We will not concern ourselves with receiving of raw materials, or the distribution of the finished product. The five sections, referred to above, may be further subdivided into thirteen operations, as follows: flour handling; aging; blending; mixing; fermenting; dividing; proofing; moulding; final proofing; baking; cooling; slicing and wrapping; all with incidental handling.

Modern Bakeries are Mass Production Plants

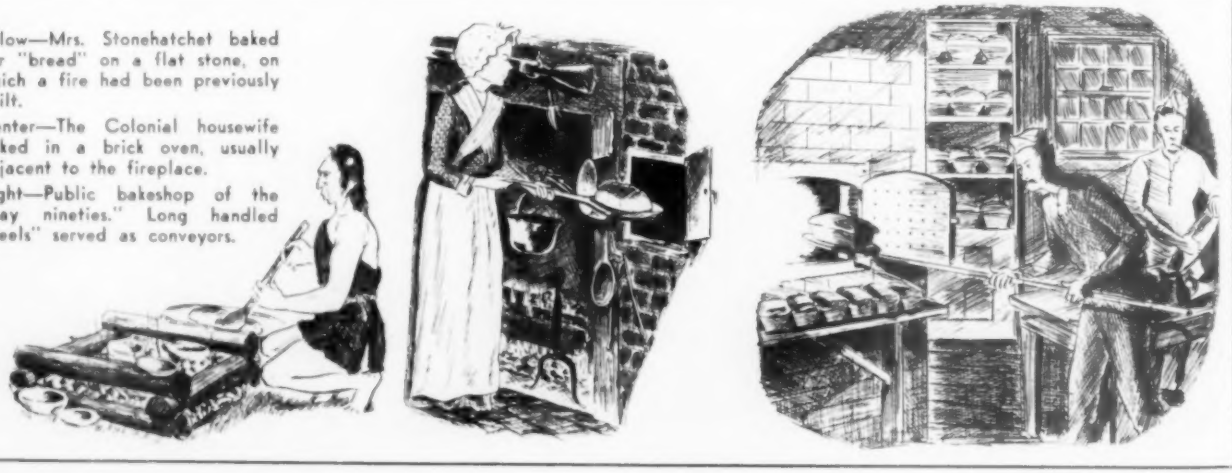
The modern, mass production bakery may be two or more stories high. Flour is delivered to an upper floor, where it may be aged or "seasoned" for several months prior to use. From there, it goes to the blenders, which may be of the continuous or batch type. Here, the various flours—white or whole wheat, rye, oaten or what will you—are carefully proportioned as required.

Fig. 1 shows a typical installation. Referring to the photograph, the blender and bolting reel is in the left background. Immediately above it, at about eye level, is the sack cleaner and dust collector. As the flours are blended, the mix is conveyed rightward, to the elevator (shown at left of storage bins) which carries it to the storage bin. The bin in the background is of 100 bbl. capacity, with a 50 bbl. bin in the foreground. To the left of it, in the near foreground, is a 3 bbl. dark flour feed hopper.

Below the hoppers are sifting machines, where all fluff is removed and lumps broken up. These machines may be of the spiral brush type, with the brushes operating in semi-circular troughs. They are very easily cleaned, contributing to the generally excellent sanitation of the plant.

All Weighing is Automatic

The next step is automatic weighing of all ingredients—flour, yeast, sugar, salt and, where included, condensed or dried milk. Here, every ingredient is meticulously proportioned, each being cut off at just the right instant. No "near enough" here; the mixture must be *just right*. The mixed ingredients then drop directly into the dough mixers. The automatic weighers, however, may be of the travelling type, first stationed under the flour hopper, or under a conveyor leading from the hopper, then moved over any one of several dough mixers. Fig. 2, shows a travelling, automatic weigher poised over a mixer.



Below—Mrs. Stonehatchet baked her "bread" on a flat stone, on which a fire had been previously built.

Center—The Colonial housewife baked in a brick oven, usually adjacent to the fireplace.

Right—Public bakeshop of the "gay nineties." Long handled "peels" served as conveyors.

the mixers (actually kneading machines, of which one is shown in detail in Fig. 3), pure water, warmed to the proper temperature, is added to the batch. Quantity is accurately proportioned by a flow meter, and the ingredients are then thoroughly mixed and kneaded to the proper consistency. It is now dough, which is dumped into large, portable pans (as shown between the operator and the mixer) when it goes into the fermentation room for rising. There, it remains for several hours, being periodically punched or kneaded—more or less as the housewife might do in her own home—to release the gases caused by fermentation.

As an alternate method, the dough is mixed in round pans, which are brought under the kneading or mixing arms; then, when mixing is done, the pans are moved directly into the fermentation or proofing room. Once there, the dough is conditioned as described in the preceding paragraph.

FIG. 1. **A typical installation for white and dark flour handling. Blender, bolting reel, sack cleaner and dust collector in background. 100 and 50 bbl. storage bins, with elevators and conveyors, at right.**

The next step is dividing, where the dough is pressed out in cylindrical form, either by rams or by means of a screw—a form of extrusion, by the way. As the dough emerges, it is automatically cut off into lengths having the requisite weight for the loaf desired. The number of outlets may vary from one to eight, depending on the size of the bakery and the daily output. A modern dough divider is shown in Fig. 4.

Dividing must be gently done, as "abuse" or too rough handling may seriously affect the finished product. Hence, pressure may be adjustable for various types or consistencies of dough. The entire operation, however, is fully automatic, with the cut-off knives accurately synchronized with the advancing dough. As soon as cut off, the pieces either fall directly into the loaf rounder, which is next in the sequence of operations, or they may be deposited on to a conveyor belt, which carries them to the rounder.

Dough Rounder Restores Skin

The rounder, which rolls the cut off dough into a ball, has the further function of restoring skin to its cut off ends as well as to aid in its conditioning. There are two types of rounders, although both are similar in principle. The one, mainly used for doughnuts and small buns, consists of an inverted, conical drum, the inner surface of which is radially grooved. The drum revolves around a spiralled, ascending trough, held closely against the drum surface. In operation, the lump of dough falls to the bottom (small end) of the drum, and is then carried upward and around the drum for about one revolution, when it is discharged from a descending chute.

The other type, used for larger loaves and shown in Fig. 5, consists of a revolving cone, also radially grooved and provided with an ascending scroll. The start of it is shown at extreme left of drum; the end is at the chute shown in right foreground. Here, of course, action is reversed, in that the dough starts its roll on the large diameter and winds up at the small end.

Action is extremely rapid. Immediately the cut off pieces

FIG. 2. **A battery of stationary bowl mixers serviced by travelling flour scales. Note the flow control which regulates the quantity of water.**

of dough fall into the rounder—and they drop in rapid succession!—they start on their upward spiralling path to the chute, in the brief interval attaining an almost perfect roundness. The action can be compared to that of a rotary thread rolling machine, in that feed and discharge are continuous.

From the chute, the rounded loaves roll onto a short conveyor, which carries them to the proofer—Fig. 6. Here, they are deposited on trays, the loading of which is automatic,

FIG. 3. **Stationary bowl dough mixer. The mixture is kneaded into dough by the revolving bars.**

and which then travel slowly through the proofer, the dough rising in the meanwhile. The proofer is air and moisture conditioned, and rate of travel, as well as temperature, is adjustable and controlled.

The trays travel in a zigzag path which insures the necessary time interval together with the smallest possible floor space for the machine. This is shown in detail through the open door of the proofer at left, Fig. 7. Note the discharge chutes at the rear of the machines; here, the proofed loaves either fall directly into the loaf moulders, or they may be de-

posited onto belt conveyors, which then carry them to the moulders. In the set-up shown, there are two discharge chutes, to serve two moulders.

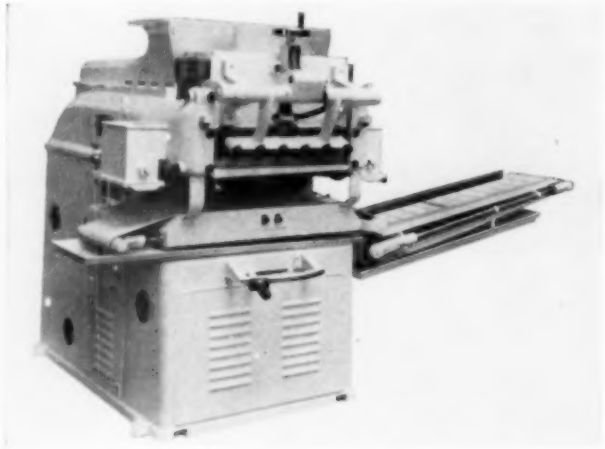


FIG. 4. Dough divider with rotary ejector mechanism. This machine "extrudes" dough, which is then cut off into the requisite weight. Entirely automatic.

The connection is well illustrated in Fig. 8, which shows the two discharge chutes directly over the moulders. The rear of the cabinet of the proofer is shown in center background, with the casing for the tray conveyors continuing forward overhead—or rearward, if viewed from the opposite or loading end. As shown in the photograph, the moulders are producing twisted loaves, this being one of the few types of bread requiring manual handling. Method of handling, from moulder to pans, is clearly illustrated.

In principle, the loaf moulders are similar in action to the rounder previously described, the difference being that the conical drum or table is replaced by a horizontally rotating drum. In the moulding of plain loaves—such as you buy from the grocer—the chute is replaced by over and under conveyor belts having differential speeds, the action being analogous to rolling a small wad of dough between the palms of one's hands. The action, and general design, is clearly shown in Fig. 9.

FIG. 5. Loaf rounder, right-hand delivery. The conical table rotates, the loaves being rounded on the upward spiralling trough. Fully automatic.

As previously described, the loaves (now cylindrical in shape) may be deposited directly into the pans in which they are to be baked. They are now ready for final proofing, which may take an hour or so. This operation, and the proofing machine used, is largely similar to the previous proofing. When discharged, the pans go directly into the travelling oven, shown in Fig. 10.

Looking directly at the photograph, the operator at extreme right is loading a pan into the oven, while his mate, at

FIG. 6. Eight pocket Divider and Reservoir; 60" loaf rounder and eight pocket double-lap proofer with dual discharge for two moulders.

his immediate left, has just unloaded a pan of baked bread. This has been dumped into the trough—or chute—shown in the center foreground, and he is now stacking the empty pan on the truck at his left. Similar operations, except that the operators are reversed, are going on at the left.

In the center, between the two ovens, is an ascending slat conveyor. As the baked loaves slide down the opposed chutes, they are picked up by the conveyor, which carries them to a

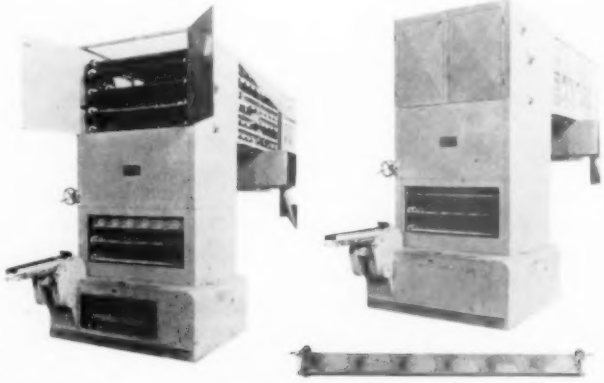


FIG. 7. Detail of double-lap proofer. Wood Trays.

higher level and deposits them onto a belt conveyor, on which they are cooled until they attain room temperature. They then descend on spiral chutes to a sorting table, as shown in Fig. 11.

The bread is now baked, and as far as the mechanical processing is concerned, ready for the final operations, which consist of slicing and wrapping. Both operations are automatic, and the machines (Fig. 12) so disposed and synchronized that flow is continuous. For that matter, the entire sequence of operations is closely synchronized, with lost time reduced to a minimum.

In studying the photographs, one is at once impressed by the clean design and careful engineering, and the suggestion

FIG. 8. **Battery of two Heavy Duty Loaf Moulders, with twisting conveyors. Rear of proofers shown in background.**

of extreme cleanliness which they convey. This is the more remarkable considering that modern baking equipment is almost entirely a development of the 20th century, or closely bordering on it.

The divider, for example, was invented in 1896, and underwent improvement and development for several years. The bread wrapper came several years later—about 1910—and

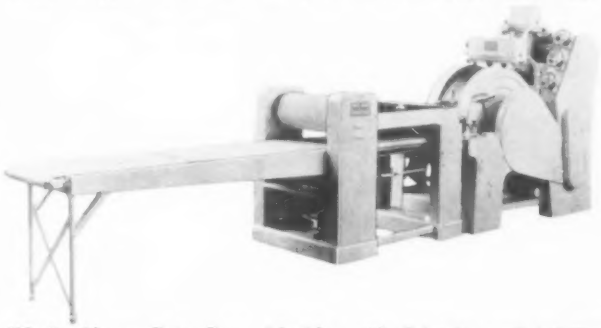
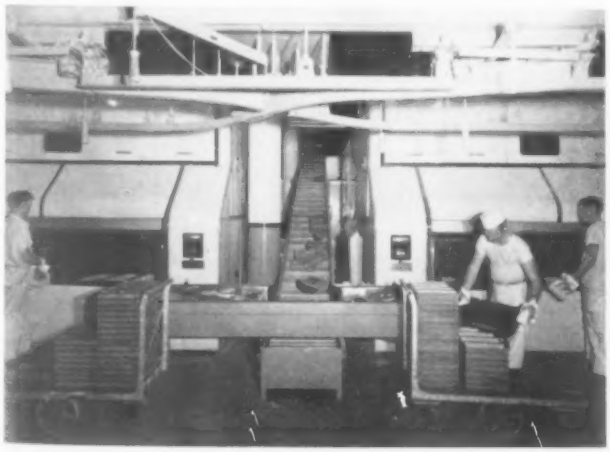


FIG. 9. **Heavy Duty Drum Moulder with Extender and twisting conveyor.**

the automatic slicer considerably later. And, while the steam oven is almost a hundred years old, and the travelling oven several decades, it took modern diathermy and gas firing to bring it to its present high state of development. In this connection, it is possible that we expect too much of induction heating; yet, it would not be surprising if this enters into the next stage of development.

FIG. 10. **Battery of two Double-Lap Diathermatic gas fired travelling tray ovens. Two-way dump chute in foreground, ascending bread conveyor, leading to cooling room, in center.**



From a viewpoint of mechanical processing, however, the modern, mass production bakery will compare in efficiency

FIG. 11. **Sorting Table, with 1½ turn spiral chute. Intermediate stage between cooling and wrapping.**

with the best of present-day industrial plants. And, as in any modern plant, the processes are entirely controlled by trained technicians, chemists, and engineers. Baking has become a science, with science at the controls.

Baking has also become big business. In the past quarter century, commercial baking has become one of America's biggest industries, ranking first in annual payroll, second among processed food industries, and seventh among all in-

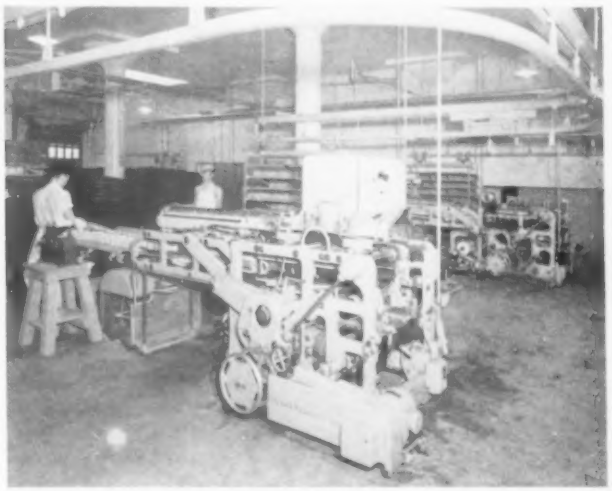


FIG. 12. **National Bread Wrapping Machine, with Micro-Western "Slice-Master," in foreground. Sevigne bread wrapper in background. Bread is now ready for delivery to consumer.**

dustries. It is not affected by depressions or business fluctuations, for, come good times or lean, people must eat.

Of all foods, commercially baked bread provides the most nourishment per unit of cost. For, considering the cost of flour, and the incidental ingredients, and heat, even the most thrifty housewife cannot compete, in the cost of production, with the modern bakery. But, however and where it may be baked, bread is the staple of diet; rich and poor alike must lean on the *staff of life*.

Photographs are by courtesy of Baker Perkins, Inc., Saginaw, Michigan, one of the leading manufacturers of modern baking equipment.

THE *Fundamentals* OF TOOL ENGINEERING

The Extrusion of Hard Metals

No. 2 of a Series

EXTRUSION of hard metals is a comparatively recent development, largely contemporary with refinement of the hydraulic press. For, while mechanical presses are used, and will continue to be used, in many lines, they lack the flexibility and steady flow of the hydraulic. The one exerts maximum pressure only as the crank approaches dead center, whereas the hydraulic can maintain uniform pressure during its entire effective working stroke.

Where the *mechanical press* is designed for constant speed, which cannot be materially reduced without danger of stalling, ram speed of the *hydraulic press* may be varied to suit, with power constant. To this may be added the advantage of rapid traverse, together with provision for dwells, pauses, and, when desired, auxiliary units. These are important considerations in many phases of extrusion.

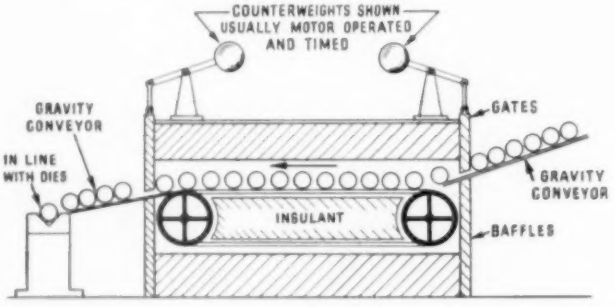


FIG. 1. Billets are heated in a furnace, rate of "flow" preferably synchronized with stroke of press and incidental handling.

WHERE soft materials—such as lead, rubber, etc.—may be extruded continuously, the hard metals are extruded from slugs or billets which are heated in a furnace, such as schematically illustrated in Fig. 1. They may be fed into the furnace by gravity, chain or pusher conveyors, and similarly discharged. Entrance and exit doors are automatically operated, the whole—as far as practical—synchronized with the stroke of the press and incidental handling. Preferably, and where scale is not a detriment, the hot billets may be immediately positioned between the ram and the die. Sometimes, however, it is necessary to remove the oxide scale, lest this destroy the dies.

Latterly, there is a sharp trend toward induction heating which, with its saving in space and time, reduction of scale formation, and closer control of heat, may entirely supersede the furnace. Time, and control of heat, are also important factors in extrusion.

Extrusion Permits Infinite Variety of Shapes

Practically any shape can be extruded, including tubes. However, length of the extruded shape will be in direct ratio to the cubic contents of the billet, and always somewhat less since it is not practical to extrude all of the billet. There will be left a thin head, which is cut off, an operation that can be and usually is automatic and simultaneous with the termination of the working stroke. The remaining stub is then ejected with the recession of the ram.

In tube extrusion, a piercing operation must be included. This may require a double action press if piercing and extrusion are to occur in one pass. Double action, in a hydraulic press, may be effected by means of auxiliary cylinders adjacent to the main cylinder, or, by means of an auxiliary ram working inside of a hollow main ram. The latter alternative is schematically shown in Fig. 2.

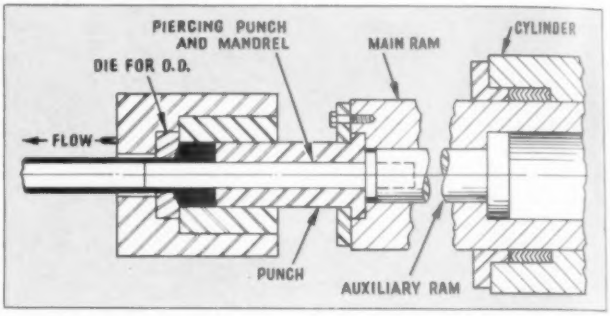


FIG. 2. Extrusion of tubes or hollow sections. Billets are first pierced, when the piercing punch serves as a mandrel for internal shape.

In operation, the billet is first positioned—as in the Vee shown at discharge end of furnace, Fig. 1—and pushed into the die by the advancing ram. Here, however, the main ram pauses, holding the billet, while the auxiliary advances and pierces. Then, both rams advance in unison, when the piercing punch serves as a mandrel to size the hole while the O.D. is controlled by the die. On the reverse stroke, the main punch acts as a stripper for the remaining slug. This is a typical procedure which, however, is subject to some variation.

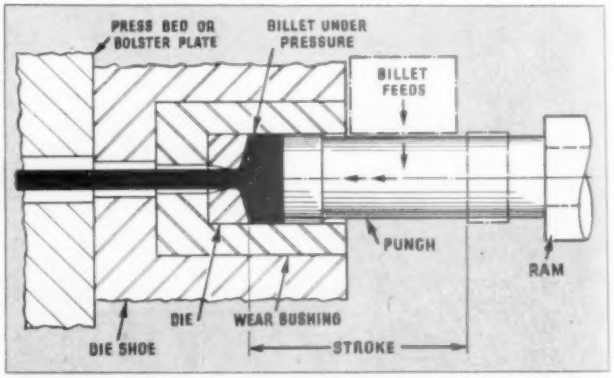


FIG. 3. Solid shape being extruded in single action press.

The extrusion of solid shapes is a much simpler affair, as shown in Fig. 3. Only single action is required; outside of that, the process is practically the same as for tubes or hollow sections. As suggested by the drawing, the billet is fed into position when the ram is at extreme recession. The action may be automatic, with the press running continuously

with just enough dwell between strokes to permit of ejecting the remaining head.

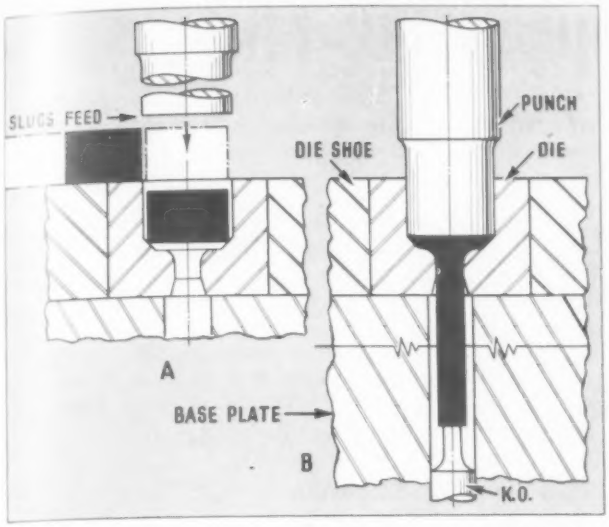


FIG. 4. Press forging—a technique in extrusion that revolutionized the manufacture of poppet valves.

One application, considered revolutionary when introduced several years ago, is the extrusion of poppet valves. While comparatively simple, the method is interesting, both from a viewpoint of technique and because of the savings effected over conventional methods of making poppet valves. The method is shown in Fig. 4, A. & B.

Either a horizontal or vertical press may be used, each with certain advantages over the other. However, the illustration shows the vertical set-up. The billets (or slugs) are fed into the die in conventional manner, and the stem and head formed in one pass. As soon as formed, the valve is ejected by means of a plunger (shown as K.O. in the illustration) and immediately cleared from between ram and die. However, this is not extrusion in the strict sense, but comes under the head of press forging, closely related to extrusion.

Press Forging—A "Cousin" of Extrusion

One of the most common applications of press forging—and sometimes called extrusion—is in the manufacture of bolts. Here, the procedure is quite the reverse of cold heading, in which the rod is merely headed over by impact. Then, when the thread is rolled (the rod being the approximate pitch diameter of the threaded section) the remaining section is smaller than the thread. The result is a poor fit in the hole. With extrusion, however, the blank is made in two diameters, one for the body size of the bolt, the other to the pitch diameter of the thread. Then, when the thread is rolled, the O.D. is constant and the finished bolt is comparable to a machined product. In fact, the extruded, rolled thread bolt, as produced by modern methods, is considered superior to the machined product by many users.

Under this heading may be included the extrusion of the steel shell, illustrated in Fig. 5, A & B. In some respects, the procedure is similar to the extrusion of the tube shown in Fig. 2. The essential difference is that instead of piercing all the way through, as with an auxiliary punch, the mandrel is part of the punch and only partly pierces.

To prevent bulging the end, the knockout (which may be hydraulically operated) is advanced, and solidly held, simultaneously with the advance of the ram. The billet then "flows," during piercing, until arrested by the knockout which, at the moment, serves as an anvil. Immediately the billet is pierced, the knockout retracts ahead of the flowing steel, which finally assumes the shape shown in (B). On the return stroke, the knockout ejects the forging and locks for the next piece.

We have now covered the essential mechanics of extrusion. To this, however, can be added that there are two distinct methods—direct and inverted extrusion. The one presumes a forward flow of material, as shown in the above illustrations; in the other, the flow is reversed, either through the punch—which would then be hollow—or between the punch and the die, as in the case of the collapsible tube described in the preceding article. Inverted extrusion is often necessary when using vertical presses.

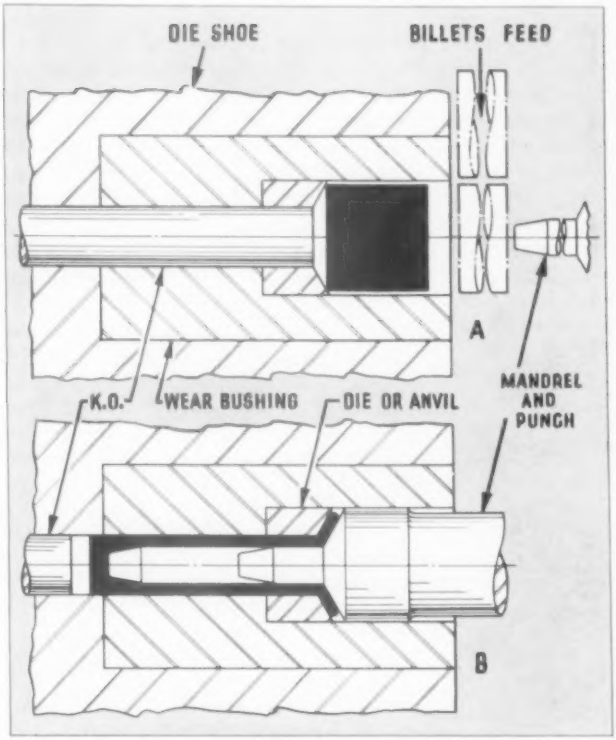


FIG. 5. Extruding shells. Knockout serves as anvil during piercing, retracts ahead of advancing ram.

The foregoing article, which is second in the series on the Fundamentals of Tool Engineering, concludes the discussion on Extrusion except as later major articles may elaborate on the subject. In the next installment, to appear in the June issue of *The Tool Engineer*, we will discuss a near relative of Extrusion—"The Rotary Swaging of Metals."

Army-Navy "E" Awards

Commercial Controls Corporation, Plants A and B, Rochester, N.Y., received the Army-Navy "E" Award on February 16.

LaPointe Machine Tool Company, Hudson, Mass., was awarded a third Army-Navy Production Award in February.

Lipe-Rollway Corporation, Syracuse, N.Y., received a fifth Army-Navy "E" Award on February 10.

Wales-Strippit Corporation, North Tonawanda, N.Y., a second Army-Navy Production Award.

Haynes Stellite Company, Kokomo, Ind., the Army-Navy Production Award, January 13, 1945.

By W. A. Johnson

Perishable Tools On The Firing Line

Selection of proper tools for each job will assure maximum tool life—pointers on salvaging or reworking worn tools

FOR AGES, man has found it necessary to cut materials. And long ago, he found that a hard material would cut a softer, as, in the transition from stone to metal, he progressively used stone, bronze, iron, steel and, lately, alloyed metals. Progressively, as he discovered new elements from which to build the various implements which he has invented and put to work, he also discovered that he needed better and harder tools with which to fabricate them. By alloying the various elements that came to light, he has developed the fine precision tools which are used today for his livelihood and, often, for the preservation of life itself. Surely it was not intended that tools should be wasted and thrown away.

After we have combined iron, carbon, manganese, molybdenum, cobalt and other elements into a tool steel for cutting, and have then processed it into a fine precision cutting tool, should we discard this tool when it becomes undersize, or because it is broken, surplus or obsolete? Or, should we salvage it, or rework it, or divert it to other uses? Certainly that would be the logical and economical alternative.

An alumnus of Knox College, Mr. Johnson has supplemented his technical training with years of practical experience. For the past 16 years has been special engineer with International Harvester Co., and is now head of the Perishable Tools & Research Dept., Industrial Power Div., I.H.C. Tractor Works. He is a member of Chicago Chapter, A.S.T.E.

In tooling up for a new part, or in retooling an old part which has been causing trouble in manufacturing, the personnel engaged in all phases of planning and designing should consider the limitations of the perishable tools which are to be used. And perishable tools, as the term is generally known, cover the range from small tool bits and drills to expensive form and compound cutters. They are perishable because they are subject to constant wear and the hazard of breakage. In other words, they are tools with a limited life.

Production Planning Should Include Tools

Often as not, they can be had by merely writing a requisition and going to the crib or by turning in a tool check, sending them back to the crib after they had been cussed at for not doing what they were supposed to do or because they broke when they shouldn't have broken, or because they were soft, when in reality the part they were supposed to cut was too hard. It is the *perishable tools on the firing line* which take the beating. They are the privates in the front trenches. They follow the orders of the officers. They go where they are told and, figuratively speaking, they try to do what they are told. Sometimes they fail. There is always a reason for their failure.

Important as they are, perishable tools are often the last to be assigned in the processing of a part. They are taken for granted—they are the repeat items which must be applied again and again on the job. They run up the burden costs, and their misapplication runs up the prime labor costs. They produce scrap, shabby quality, or, they produce ultra precision quality, all depending on how they are assigned and used.

Poor quality of product is not necessarily the fault of the tool, since the same tool can produce quality or scrap, depending on how it is used. Yet, in all cases, there is the *right* tool for the job.

Tool Standards Important

The tool engineer can help the situation immeasurably by following standards. He can keep at hand and refer to various tool catalogs, thus selecting to limits, tolerances, etc. By doing so he places limitations on the processing engineer in the manufacturing department on how he must break down his various operations and assign each operation to the various machine tools and request major and minor tooling for his job. Of course, he must always consider the fundamentals of the design of the part.

The process engineer, too, can help in this matter. Of course, he is limited in what the product designer has put on his blueprint, and he must request and assign the machines and the various operations to produce the final design dimensions, but, he should not try to hold a .0005″ limit on a drill press, or even with a reamer. He must grind, broach, lap; must actually assign the right operation for the final results which are measured by the ability of his perishable tool to produce those results. All concerned must consider the ability of the Privates in the front line trenches to face the enemy—that is, the job.

Now, of course, the perishable tool engineer has a responsibility also. He must select grades and request the proper design, and apply each perishable tool correctly. He must decide whether High Speed, Stellite, Carbides or other hard metal tools can be applied properly under the limitations of part design and process functions.

Good Tools—Correct Specifications

The Stores Department must purchase quality tools from reputable concerns. The perishable tool engineer must furnish the Stores Department with correct and detailed specifications for each and every tool, including grinding wheels. For, even grinding wheels are perishable tools. A grinding wheel consists of millions of little cutting tools held together by a common bond. The grain must be correct, the type of bond must be correct, the wheel speed and work speed, and the feed must be correct in order that grinding wheels may function properly.

Perishable tools must be sharpened. They get dull. Grinding wheels must be dressed. Modern industry has found that the most economical and efficient manner to handle this problem is by centralized tool grinding. The perishable tool engineer, in conjunction with the tool design department, must record on individual prints the correct grind for each and every tool.

The tool grinding department must grind these tools with the proper wheels. They must not be burned. The proper

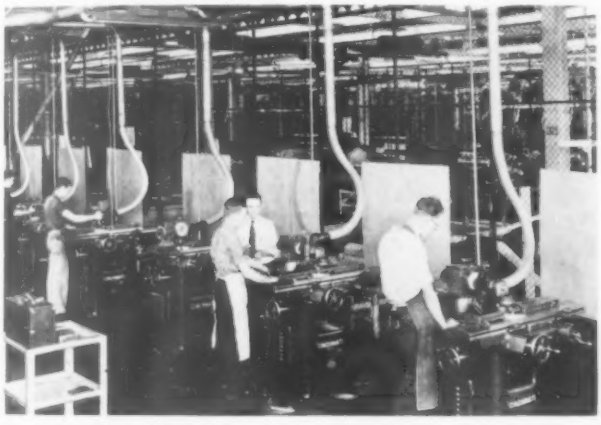
clearance must be applied. They must be inspected after they are ground, so that they are ready to go out on the firing line. The machine operator must not use these tools too long, lest tools will be ground away when sharpening.

Also there are several new methods—and several old ones—of increasing tool life which are in current use. A great deal of work has been done lately in reclaiming or salvaging tools after they are supposedly worn out, broken, surplus or obsoleted. But before discussing that, an example of a recently reported tool failure may illuminate the subject.

A manufacturer called, long distance, and said that he could not ream a certain vital part. A tool research engineer, sent posthaste to this company, found the following difficulties. Fixtures were bad and locating rings soft. There were no gages on the job; there wasn't even a set of Jo-Blocks in the plant. The reamer grinds were bad, machine tool application was equally bad and yet—it was the reamer which was to blame! You see, the perishable tool was the measure of this failure. After correcting all of the above mentioned items, this manufacturer is now well on his way towards satisfactory production.

We will now briefly discuss five ways in which a cutting tool can be protected and made to last longer. They are: 1. The right tool on the job; 2. proper feeds and speeds; 3. proper grinds, clearances, etc.; 4. proper coolant and lubricant, and 5. fine finish grinds. The above five items may be accepted as necessary in the successful application of a cutting tool.

There are four additional means which are being tried and experimented with to provide additional protection and longer



Centralized tool grinding insures maximum efficiency of cutting tools.

life for cutting tools. These are: A. Nitriding; B. Sub-Zero Freezing; C. Microblast; D. Flash Chrome Plating. The above four items will be discussed later; first, however, let us consider the five accepted means of increasing tool life and maintaining perishable tools.

1. Right Tool on the Job

You have been shown the necessity of selecting and assigning the right tools for the job, and how it is imperative that each and everyone who has any part in designing, processing and the actual building of all of the tooling for manufacture keep the cutting tool application in mind. It is also necessary that all of this tooling, which has been provided, be properly set up on the machine.

Departmental tool cribs must be maintained, with adequate records and coordination between the grinding department and the engineering department, so that the right tools are always available for the repeat requirements of the machine shop. In this connection, departmental tool cribs can not function efficiently if they are not given the full time and consideration of a competent individual who can make decisions and act as a liaison man between these various departments.

2. Proper Feeds and Speeds

A cutting tool will only do so much work. If run too fast, or if fed into the work too fast, it will burn and become useless. If run too slow, it will chatter. If fed too slow, it does not have enough work to do and vibration destroys its keen cutting edge. Before High Speed Steels, Stellites, and Carbide tools were used in production, much less production and poor finishes resulted. Why? Because feeds and speeds had to be slower and cutting edges did not stand up as well. Much lost producion and wasted cutting tools are the results of improper feeds and speeds.

3. Proper Grinds, Clearances, Etc.

A cutting tool will not cut if it is not ground properly, with a correct clearance backoff on the face and side of the cutting edge. This varies with the conditions under which

Sharpening slotting cutters of uniform diameter with one setting.

each respective tool is used. A machine operator cannot grind a hob or a broach or gear shaper cutter or other special tools. These types of tools must be ground on special machines by experienced tool grinders. More common tools, such as drills, reamers, taps, and tool bits can be ground in various ways depending upon their application.

The old time machinist will always have his pet method of grinding, the method varying with different machinists. Now, all of these men may have good points which they stress, yet, they can not all be right nor can they all be wrong. But, one of these grinds, for each type of tool, and for each application, must be the best. It is absolutely necessary that these be recorded on blueprints and kept up to date in the centralized tool grinding department.

4. Proper Coolant and Lubricant

We often hear the remark, if a cutting tool is acting up: "Give us a better cutting oil." What is a better cutting oil? It is generally thought that one with more sulphur and E.P. qualities is the better. If one is machining soft, mushy material, the more potent cutting oil is necessary in order to keep the soft, mushy chip from welding to the tool. But, on heat treated stock of medium on up hardness, a film strength is not needed and tends to keep the tool away from the work by the film strength of the oil, thus giving it less chance to work. When this happens, a dull tool is the result, with breakage and scrap.

The application of the coolant is very important. A large volume is always desirable in a plentiful, easy flow. A lot of pressure, except in special cases where chip removal is important, is undesirable. The coolant must be directed right at the work and not so that it splashes from the fixture or other parts of the tooling or machine. Much can be gained by the correct application of the right kind of coolant at the right place, to protect cutting tools.

5. Fine Finish Grinds

There seem to be some differences of opinion as to the benefits derived from fine finish grinds on tools. However, we may agree that the objections—or the differences of opinion—are only on special applications. We all know how it feels to shave with a nicked or unstropped razor, and we can easily imagine how it would feel to shave with one merely rough ground and not honed.

Roughing out the various cutting tools with 40 to 60 grit grinding wheels of the proper hardness, and then finish grinding them with a wheel up to 320 grit, can help to improve cutting action and that fine grinding should increase their life. It is strongly recommended that carbide tools be diamond lapped after they are ground with a silicon carbide wheel. Figures are available to prove that fine finish grinds pay. It is necessary however, to have far more extensive tool grinding facilities for this, as it is uneconomical to change wheels during the grinding process.

The following four items which have already been mentioned are being experimented with by industry at large for still further increasing tool life. However, it may be wise to remain open-minded in considering these items, at the present time being neither too strongly for or against them. Let us take them one at a time.

A. Nitriding

As most of you know, nitriding is a process of subjecting a tool to a hot salt bath which imparts a very thin, hard case on the tool. This treatment makes the tool extremely brittle and hard on its exterior surface, but does not change the core. There are many applications where a tool subjected to this treatment would be benefited. It is not recommended as a treatment for all tools, since each individual case should be studied before Nitriding is tried.

B. Sub-Zero Freezing

First, in the making of a precision cutitng tool, after the tool steel is shaped, it is necessary to harden it. Various manufacturers use different methods. The hardening of a tool consists primarily of:

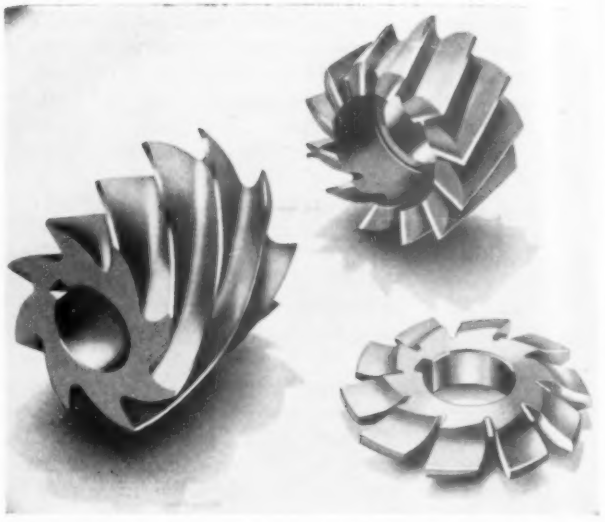
1. Normalizing to remove machining stresses.
2. Subjecting the tool to a high heat (approximately 2300° to 2400°F.) in an atmospheric controlled furnace or salt bath to prevent scale and decarburization.
3. Cooling to room temperature.
4. It is then put in the draw furnace and brought up to a temperature of somewhere around 1050° F., depending upon the hardness desired.
5. Cooling to room temperature.
6. Some toolmakers advocate that tools be subjected to a second and even a third draw in order to complete the transformation from Austenite to Martensite.

The sub-zero freezing of a tool—or bringing it down to 120° below zero or lower—is supposed to more thoroughly complete this transformation. Some claim that this sub-zero treatment does not do any good unless it is applied immediately after the quench, or immediately after the first draw, on tools of peculiar design which might crack from interior stresses. In any case, the object of this extra treatment is to complete the transformation of Austenite to Martensite and then to draw the tool to relieve brittleness. In our plant, we have found no particular advantage in subjecting tools to this treatment and have, therefore, concluded that most of our tools have received their proper heat treat by processing as from 1 to 5 above.

We are informed that sub-zero treatment of tools must be started within a period of not to exceed one hour after quenching or after the first draw; however, we may question any benefits resuting from taking a tool from the shelf and subjecting it to sub-zero treatment.

C. Microblast

This process consists of subjecting a tool, in its hardened state, to a blast of very microscopic particles of either metal or abrasive materials, to give a keener cutting edge or to surface harden or surface peen a tool to increase its life. We have not tried this process and can not judge its value how-



A few of the hundreds of types of milling cutters used in modern production.

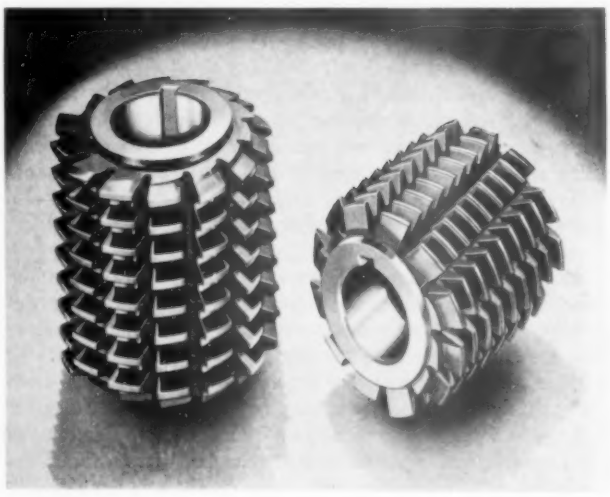
ever, there must be a practical advantage in its use as a process to be used prior to the flash chromed plating of a tool which will be discussed as the fourth item, as follows:

D. Flash Chrome Plating of Cutting Tools

Briefly, the process consists of taking a properly hardened and ground tool, cleaning it thoroughly and applying, in a conventional plating manner, a protective plating of chrome. The chrome must be applied over a hardened tool as the thickness of the plate is so thin that the hard qualities of chrome have no more benefit than those already in the base metal. The peeling of chrome plated tools has been a drawback retarding the wider use of this process.

Now, chrome is the third highest element in hardness, the diamond being first, with boron carbide second. Therefore, if the application of chrome to a cutting tool can be successfully done we have really accomplished something. The object of this flash chrome is to prevent scuffing and burning of the cutting tool edge and to keep the chips from welding to the tool. Because chrome has a very high melting point—between 3100° and 3200°F.—it should accomplish this.

Hobbing cutters must be specially designed for the job.



Mr. Axel Lundbye, of the Crowell-Collier Publishing Co., has developed a flash chrome plating process for which he claims that the application of chrome to a cutting tool can be done without changing the size of the tool, without peeling and which will increase tool life to unbelievable extents. However, research has brought out the fact that chrome plating cannot be added in excess of .000018" without peeling. We have had difficulty in finding a plater who could consistently apply a uniform plate of this thickness to a tool of irregular shape, and feel that this is the reason for failure. However, it is probable that close co-operation between industry and the platers will eventually lick this problem and that flash chrome plating of tools will eventually be a benefit to industry.

Reclaiming Worn or Obsolete Tools

Now, let us assume that we have done all that can be done to protect cutting tools and prolong their life. There remain four possible ways of reclaiming these tools, after it is found that they have outlived their usefulness on the immediate job. Three of these means are quite satisfactory, but one—that of annealing and reworking—is not too desirable from a standpoint of cost, equipment required, and the performance of the tools after they are reworked and rehardened. The three satisfactory methods are:

1. *Conventional regrinding in the hard.* This consists of grinding tools in their hardened state to a new size of the same type of tool ,or of grinding into another tool. For instance: making a reamer of a smaller diameter from an undersized one; grinding the threads from a tap and converting it into an end mill or gage; grinding the thin or broken teeth from a spline or gear hob and then regashing on a hob grinder, making it into a milling cutter or shell reamer, or grinding the teeth from a worn-out thread milling cutter and then regashing it on a hob grinder and transforming it into a plain milling cutter. Care must be exercised in the selection of the proper wheel to do this grinding work.

2. *Built up welding.* Many efforts have been made in recent years to develop a welding technique and a welding rod which can be used for building up and replacing broken teeth in cutting tools. A great many welding alloys have been tried but generally the temperature necessary to application has been too high.

Choice of Welding Rod Important

What is desired is a welding rod with sufficiently low melting point so that the heat of application is low enough not to anneal the rest of the cutter, and still leave the built up or replaced tooth, by air hardening, of sufficient hardness necessary to a cutting tool. There are welding rods and alloys of this nature on the market and it may be well to consult your various welding supply houses for suggestions.

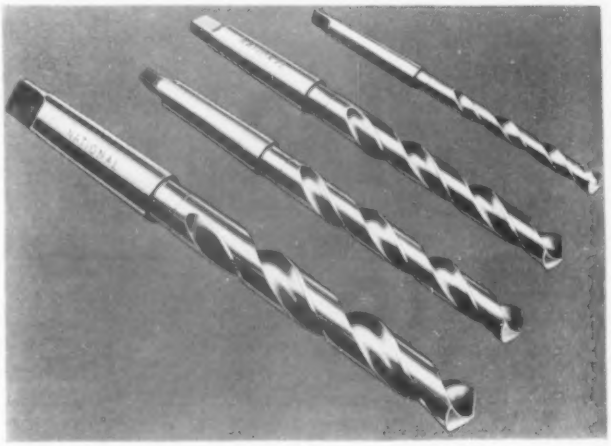
3. *Low temperature brazing.* This process is no longer new, rather, is a tried and accepted procedure. Its application seems limitless and on the whole, very successful. It consists of brazing, at temperatures just below those harmful to the hardness of high speed tools, broken parts or new sections to a tool without affecting its hardness. Almost any type of tool can be reclaimed by this method. The equipment required is not extensive and is available in any welding shop.

Most tools require the use of an alignment fixture while brazing. This fixture need not be elaborate, but should be accurate. The use of stock, mill run angle plates and clamps is not sufficient, and should be discouraged. Fixtures should be constructed with positive clamping devices in the lower section of the fixture and spring plunger, floating, locating devices in the upper half of the fixture. This design is necessary so as to insure the correct join fit of .0015" in the shortest period of brazing heat.

Steps common to this type of tool reclaiming are:

1. Preparation of the surfaces to be joined. If an even break has occurred it is not necessary to grind the joint ends. If a fractured break has occurred, the two respective ends should be dressed square by a grinding wheel.
2. Clean the surface of the two parts thoroughly with carbon tetrachloride, using a soft bristle brush.
3. Coat the parts with autochemic flux.
4. Apply an oxyacetylene torch to the joint ends.
5. Apply the brazing material until it flows thoroughly through the joint.
6. Grind or file the excess material from the tool.
7. Sharpen the tool in the conventional manner.

There are several rods used for low temperature brazing. They consist of alloys of copper, zinc, nickel, phosphorus, cadmium and 40% to 60% of silver. Their melting points vary from 800° to 1600°F. The alloys used in tool brazing should be selected to range in melting points from 1175° to 1800°F. Since the draw temperature of most high speed tools is between 1000° and 1100°F. you may, therefore, wonder how a hardened tool can be brazed without affecting its hardness.



Drills are among the most perishable tools—and most easily conserved.

In order to anneal a tool, a soaked heat must be applied above its critical point. This does not happen in low temperature brazing as only a few minutes brazing heat is necessary.

Most tools should be preheated to between 600° to 800°F., before brazing, to avoid setting up stresses in the tool which might cause it to break. This preheating can be done either with a torch, applying it from the center of the tool out, or in a small furnace. The brazed tool should be cooled gradually by placing it back in a furnace or in mica dust or asbestos.

With practice, most welders can be trained and become adept at tool brazing. Vast sums of money can be saved by putting to work discarded tools by these processes of salvage and reclaiming.

In conclusion, we may stress that the proper set-ups in the Engineering and Planning Departments are musts in the coordinating of all phases of fabrication of a part, so as to give the perishable tools out on the firing line a chance for preservation and the winning of the battle of removing the chips of industry. The selection of the men to follow this work is extremely important. They must have the necessary aptitudes, desire and skill in their work, since perishable tool engineering is not taught in schools. Industry must train men to follow this important function.

By Sherman B. Hagberg

"Engineering" A Tool Engineering

How Engineering Principles can be applied to the design of a modern and highly practical educational program for Tool Engineers

FOR MANY YEARS, the members of the American Society of Tool Engineers have felt a definite need for more adequately trained tool engineers than were being supplied through the normal channel of upgrading machinists, tool makers and tool designers who, in addition to mechanical or designing skill, had certain technical training. Although the Federally supported short courses, which have been offered by many colleges and universities during the present war period, have been of some help in supplying men to change over and tool up vast industries for the manufacture of war materials, it was apparent that these courses did not satisfactorily meet the long range need.

Sherman B. Hagberg, Instructor in the Mechanical Department, Rochester Institute of Technology, was graduated from the University of Rochester in 1933. A member of Rochester Chapter, A.S.T.E., he is author of a book: *Machine Shop Practice*, published 1942 by Harper & Brothers.

With the foregoing thoughts in mind the National Education and Training Committee of the A.S.T.E., of which Mr. Otto Winter is chairman, proposed that the society attempt to find a technical institute, college or university that was willing to inaugurate a course which would more adequately prepare young tool engineers than any of the existing mechanical or industrial engineering courses. In 1943, the committee sent questionnaires to executives in many of the larger manufacturing companies throughout the nation to determine the need for this type of training. The returns indicated that a very definite need existed.

In Rochester, New York, a demand study was made cooperatively by the local chapter of the A.S.T.E., the Rochester Institute of Technology and the Industrial Management Council of the Chamber of Commerce. Here, too, it was found that a very definite need existed for Tool Engineering education. As the Institute has for many years had the policy of always being willing to study the needs of the community and to offer courses to satisfy these needs, the administration offered its facilities and personnel in any way which might be of greatest service to the A.S.T.E.

The Rochester Institute of Technology

The Rochester Institute of Technology is a privately endowed, non-profit making educational institution offering technical training in eight departments, five of which operate on the co-operative basis. The co-operative program has been in operation continuously since 1912 with only a brief break during and immediately following World War I. The co-operative program is currently carried on in the mechanical, electrical, industrial chemistry, retailing and food-administration departments. Students are placed in jobs which have a direct bearing on the major field in which they are studying and provision is made for a continuous integration of school and work. Local industries and business co-operating with the Institute look on students as supervisory material in training and normally arrange a sequence of jobs so that each student has the opportunity to get an overall picture of the plant in which he is employed. The Institute curricula have been constructed from activity analyses of the skills, duties and attitudes required of successful workers. Hence, co-ordination of theory and practice is obtained as a student works on a job, in his chosen field, and studies from manuals which have been written after a careful study of the industrial demands made upon workers in his major area.

Constructing the Tool Engineering Curriculum at the Institute

Representatives of the Institute and the local chapter of the A.S.T.E. met with the National Education and Training Committtee in Detroit in February, 1944, to discuss plans for a Tool Engineering course. Following this, a tentative course of study for a three year co-operative program was prepared and general approval obtained at the annual meeting in Philadelphia. Despite this tentative approval, the Institute administration felt that if an engineer curriculum were to be constructed it was only reasonable to apply scientific principles to its formulation. Educators—and engineering educators have been no exception—are prone to employ the scissors and paste pot method of curriculum construction. In this technique, a wide selection of catalogs from educational institutions is obtained, and after some study the most likely sounding courses are cut out and pasted into the "new" curriculum. While this procedure saves considerable time, it violates the fundamental engineering principles of having the functions or objectives of the end product clearly in mind as each individual part is designed so as to best serve the desired finished product.

The Institute administration believes that the following steps should be taken in order listed if a functional, well integrated program is to result: (1) A demand and supply study should be made to determine the need for training in the area and the extent to which this need is being satisfied. In the present case both the national and local study indicated a demand for which no comprehensive training was being offered. (2) A job chart should be constructed depicting the basic, supplementary and related jobs for which the training is offered. In addition, the training and intermediate jobs that a student and employee might pass through as he works toward his objective should be shown. (3) An activity analysis should be made which indicates the knowledge, duties, skills and attitudes required of a tool engineer. (4) After the activity analysis is complete, the items which have been indicated as essential should be assigned to individual courses.

In order to illustrate a bit more clearly just how each of the above steps was taken, the job chart, activity analysis and assignment of activities to courses will be discussed a bit more in detail.

Curriculum . . . .

Engineers, be they aeronautical, chemical, electrical, mechanical or tool, do not spring full bloom when the college president hands out diplomas at the customary June graduation. Several years of practical experience must be gained during which time the young graduate learns to make practical application of the theories studied in school. During these early years it is probable and desirable that the graduates will hold several different training and intermediate jobs which will give the background and experience to become a full-fledged engineer. In Table I is shown a Job Chart which indicates the types of training and intermediate jobs that a man might hold on the way to his desired goal of a tool engineer. As it is always probable that a man may end up in a job supplementary to or related to tool engineering, these are also shown. These are, however, positions comparable in both salary and professional status to that of a tool engineer.

TABLE I

JOB CHART FOR TOOL ENGINEERING CURRICULUM

Basic Job	*Supplementary Jobs*	*Related Jobs*
Tool Engineer	Chief Tool Designer Chief Tool Inspector Supervisor of Tool Making Dept.	Chief Engineer Production Engineer Sales Engineer Works Manager Tool Procurement Manager

Basic Intermediate Jobs	*Supplementary Intermediate Jobs*
Tool Room Foreman	Plant Layout Supervisor
Operation Planner	Cost Analyzer
Tool Designer	Instrument Maker
Cost Estimator	
Design Checker	
Tool Estimator	
Tool Order Clerk	
Tool Maker	
Expediter	
Tool Inspector	

Training Jobs	
Machine Operator	Time Study Observer
Assembler	Tool Crib Attendant
Foundry Worker	Parts Inspector
Heat Treater	Errand Boy
Pattern Maker	Tool Room Apprentice
Tool Order Clerk	Stock Room Clerk
Tool Grinder	Tool Draftsman

THE JOB CHART shown on this page is based upon a study of available jobs in the field of Tool Engineering. Reading from the bottom:

TRAINING JOBS are those that a co-op student may hold.

INTERMEDIATE JOBS are those that may be held by young graduates.

BASIC or TERMINAL JOBS are those toward which the subject matter of the course and the co-operative training is specifically directed.

SUPPLEMENTARY and RELATED JOBS are those into which a young man may move as a result of personal interests, or specialized training and experience.

The Job Chart in Table I was constructed after conferences with members of the local chapter of the A.S.T.E. and checked by members of the National Educational Committee. In the Institute program, students will hold many of the training jobs during the period they are on the co-operative job. Sequences of training are now being worked out with the companies where students will be co-operatively employed. Hence, during the students' course of study, they will receive many valuable job experiences which are normally not available to engineering students enrolled in full-time courses.

Although the Job Chart is a valuable aid, this still does not indicate the material which should be included in the courses if the latter are to be functional. In order to obtain this material it is essential that an activity analysis be made and the techniques of making this will now be presented.

Making the Activity Analysis

One of the basic policies of the Institute calls for the making of activity analyses in order to validate the content of its instruction. In making an activity analysis, every effort is made to record the skills, knowledge, attitudes and duties required by the individual in the basic terminal job. This has already been done for the more than twenty-five jobs which are included in the Institute curricula. In constructing the activity analysis for the job of tool engineer, the following techniques were employed: (1) An initial list was made by Institute staff members who had had experience in the field; (2) a careful study was made of all the published material concerning the job of Tool Engineer; (3) interviews were held with tool engineers employed in various plants throughout the country and, (4), members of the local committee contributed many valuable suggestions from their own experiences.

After all of the foregoing techniques were utilized in collecting the master list of duties, these were grouped according to a functional classification and each duty was numbered consecutively.

TABLE II

TYPICAL DUTIES OF TOOL ENGINEER TAKEN FROM ACTIVITY ANALYSIS

*71. He makes electrical power calculations.
72. He designs jigs, fixtures, special gages and machine parts involving electrical circuits, stops, relays, gaging elements, magnetic and electronic devices.
73. He lays out electrical circuit diagrams.
74. He makes use of simple theory of lenses, mirrors and prisms in the design of certain gaging devices and assembly fixtures.

75. He applies principles of hydraulics to design of hydraulically operated machines and fixtures.
76. He applies principles of hydraulics to design of rubber forming dies.
77. He applies principles of hydraulics to plastic flow of metals in
78. Punch press work
79. Extrusion of metals through extrusion dies.
80. He solves algebraic, geometric and trigonometric problems in:
81. Design of tools, dies, and fixtures.
82. Electrical power calculations.
83. Strength of materials calculations.
84. Force, velocity and time calculations.
86. He solves problems involving occasional use of calculus in
87. Centers of gravity.
88. Moments of inertia.

**Numbers are those used for indexing in complete activity analysis.*

Typical duties taken from the analysis are shown in Table II. In all a list of several hundred duties was collected involving activities which would have to be taught in the technical and general education courses. It should be emphasized that this activity analysis is not viewed as a static list but is subject to alteration in light of experience. Additional activities will be added from time to time as co-operative students report on duties which they have encountered, as the curriculum develops and as new developments take place in the field. Major advantages of this analysis are that it: (1) assists the staff to formulate objectives for their courses; (2) validates the material which is taught in the courses; (3) eliminates duplication and superfluous material; and (4) tends to provide greater student incentive by virtue of its showing relationship between theory and practice.

Balance Fundamentals and Practical Subjects

There is one pitfall in the use of the activity analysis of which the Institute staff is well aware, and steps are taken to avoid this. It is possible that one might construct a course from an activity analysis and teach only the details included in the list while neglecting to give proper emphasis to the fundamentals and principles involved. The use of an activity analysis does not preclude other recognized and accepted techniques of curriculum building such as, opinion of experts in the field; analysis of textbooks; and study of other similar curricula. It supplements all of these and in addition provides a rather detailed picture of the activities that the young engineer will sooner or later carry on.

The next step in the procedure was to allocate duties to the course where they would receive major or minor treatment. Department members in conference allocated each duty to the course where it would be treated. From this list manuals have been prepared for the several courses included in the curriculum. As the Institute has had a Mechanical Department for many years, the majority of the courses to be included in the Tool Engineering Curriculum are already being taught. In these cases it will mean a close study of these courses to determine additional materials which should be included. For the new courses the analysis will provide a valid basis upon which to judge the content. In addition, new courses will be reviewed by the local and national Educational Committees of the A.S.T.E. for their suggestions and criticisms.

The Tool Engineering Curriculum at R. I. T.

The three-year co-operative curriculum in Tool Engineering as it will be inaugurated in the Fall of 1945 is shown in Table III.

TABLE III

TOOL ENGINEERING CURRICULUM AT R. I. T.

First Year

Subjects:	*Credits*
Mathematics	5
Mechanical Drawing	5
Machine Shop	9
Psychology	3
Mechanics and Heat	5
English and Study Techniques	2
Total credits	29

Second Year

Subjects:	*Credits*
Mathematics	3
Economics	3
Drawing, Mechanism and Elementary Tool Design	6
Strength of Materials and Metallurgy	8
Tool and Die Making	4
Electricity	3
Foundry Practice	1
Process Engineering	2
Total credits	30

Third Year

Subjects:	*Credits*
Production Planning	3
Optics and Sound	2
Tool Design	9
Materials Laboratory	3
Industrial Management	3
Tool Engineering Costs and Control	4
Process Engineering	6
Total credits	30

Although some of the courses have names similar to those found in any of the college engineering curricula, it should be kept in mind that the scientific principles of curriculum construction have been utilized in developing these courses. In

this manner much of the superfluous material taught in many college courses, and which is rarely if ever used by engineering graduates, has been eliminated.

Every effort has been made to design the three-year cooperative course so that it will be functional while still placing adequate emphasis on the engineering principles necessary for a well-balanced program.

Description of Courses

FIRST YEAR

Study Techniques. This course is required of all students whose performance on diagnostic test indicates inadequate or faulty study habits; such as, incorrect eye movements while reading, cumbersome methods of selecting major ideas, vocabulary difficulties, or similar poor study habits. Instruction in study habits for those needing it will continue until the student demonstrates that his study habits have been sufficiently improved.

English. A series of tests on grammatical usage and the basic elements of writing locates for each student his difficulties in English. By classroom discussion and by written exercises, students correct the faults which have been discovered through the tests. Course materials are prepared to permit each student to concentrate upon the portion of the work which he most needs to attain a satisfactory standard in both written and oral English.

Mathematics. This course includes the following topics: algebra through quadratics; complex numbers; simultaneous equations; trigonometric functions of angles; identities; solution of right and oblique triangles. Use of the slide rule and logarithm tables is included in the instruction.

Heat. This course is designed to present the fundamental principles of heat engineering as background for the advanced courses in power equipment and heating and ventilation. It includes the following topics: nature of heat energy; relation between heat, mechanical, and electrical energy; calorimetry; expansion of solids, liquids and gases; conduction, convection, and radiation and humidification. Laboratory work is given.

Mechanics. This course is designed to present the fundamentals of mechanics as prerequisite material for the advanced courses in applied mechanics and strength of materials. It includes the following topics: parallelogram of forces, triangle of forces and force polygon, free body diagrams, movement theorem, conditions of equilibrium, couples, forces in space, friction, work and power, velocity and acceleration, inertia forces and other topics in linear and rotational kinetics.

Mechanical Drawing. This is an introductory course in mechanical drawing, including instruction in the use of instruments, lettering, applied geometry, orthographic projection, developed surfaces and intersections, drafting conventions, machine drawing, assembly drawing, tracing, pictorial representation and technical sketching.

Psychology. In this course the student uses the principles of psychology that apply most directly to problems of leadership, covering such general topics as the interaction of native and environmental factors in personal development, incentives, discipline, learning and training, employment methods, influence of working conditions, and industrial relations.

Machine Shop. The elementary machine shop course involves the use of both hand and machine tools with the major emphasis placed on the use of machines because of their universal use in modern production. Instruction is given in the techniques of handling lathes, milling machines, shapers, drill presses and grinders. Students following the instrument makers curriculum are given a more comprehensive course in the use of machine tools, and emphasis is placed on the skillful manipulation of hand tools and the use of accurate measuring instruments.

SECOND YEAR

Mathematics. Instruction is given in analytical geometry, consisting of equations of lines and conic section curves, giving practice in graphical solution of equations and the construction of nomographs. Elements of differential and integral calculus are presented.

Strength of Materials and Metallurgy. This is a study of the relationships between stress and strain; stresses and deflections in beams, shafting, columns, and machine parts; the manufacture, processing, and handling of common materials of industry. The common materials covered are: steel and its structure, non-ferrous metals, and alloys, wood, concrete, abrasives, and lubricants. Emphasis is placed on the materials related to machines rather than structures. Instruction is also given in metallurgical terms, constitution diagrams, the space lattices theory of hardening, heat treating, the general properties of the commercially important metals and alloys, and a survey of metallurgical inspection methods and equipment. Sufficient chemistry is taught to give a student an understanding of the fundamental metallurgical reactions.

Drawing, Mechanism and Elementary Tool Design. The design of any machine consists in adapting known mechanical appliances to meet special conditions. That is, there are certain elementary units such as levers, screws, cams, cranks, gears, quick return mechanisms, motions, chains and sprockets, which are the basis for all machines. These are the topics which are studied, together with the design of basic cutting, stamping, forming and other tools used in the fabrication of various machine parts.

Economics. This course gives the student a systematic introduction to economics. Emphasis is placed upon the economic problems which arise in business and industry and some of these with which the individual is most commonly confronted in the management of his private affairs. Special effort is made to apply economic theories to current developments.

Electricity. Instruction is offered in those phases of electricity which apply directly to the mechanical field. The course consists of three units of work as follows: the electric circuit; motors and their application; and transformers and generators. Optional work may be taken in electrical measurement of temperature; the measurement of power by means of a dynamometer; and interior wiring. Approximately half of the time is spent in performing laboratory experiments.

Tool and Die Making. A combined shop and theory course covering tool and die making methods, shop techniques and equipment. The course provides a variety of shop exercises in the making of various tools, dies, jigs and fixtures. The principal objective of the course is to develop a knowledge of tool and die making, and as high a degree of manual skill as time will permit.

Foundry Practice. A classroom course to study the principles and practice relating to castings of gray iron, malleable iron, steel, brass, bronze, aluminum alloys and bearing metals. Some time is devoted to the design, construction, and use of wood and metal patterns required in the casting of metals. Consideration is given to the use of core boxes, cores, fallow boards, mold plates and sweep patterns. Inspection trips to foundries will supplement classroom work.

Process Engineering. This course will acquaint the student with the machinery, equipment and tools used for producing various kinds of work pieces on a production basis. An elementary course in tooling and fabricating methods together with the required sequence of operations will be included.

THIRD YEAR

Production Planning. This course reviews the duties and functions of the production or planning department in the modern industrial plant. The topics covered are: time and motion study, wage and incentive systems, materials

handling equipment, routing and scheduling of parts through the shop. Instruction is given in planning and arranging equipment to get the most economical flow of products in process of manufacture.

Optics and Sound. This course covers those topics in optics dealing with optical instruments. These include intensity of light, reflection, lenses, telescopes, microscopes, photographic optics, diffraction and interference, polarization, photoelectric effect, and industrial equipment. The section on sound covers sources of sound, reeds, air columns, diaphragms, etc., propagation of sound, insulation and building acoustics.

Tool Design. This course consists of a number of units covering the study and design of production tools, such as punches and dies, gages, tools for automatic screw machines, jigs and fixtures. Topics covered include technique of preparing drawings, tool design standards, tolerances, springs, details of jigs and cam layouts. The student is encouraged to develop creative ability and originality. Opportunity is given the student to design a complete set of tools for the production of a specifice workpiece.

Materials Laboratory. This includes measurements of strength, elastic limit, yield point, area reduction, elongation, and elastic modulus on the Universal Testing Machine. Hardness tests are made with the Brinell, Rockwell, and Herbert Pendulum testers. Other projects include measurements of endurance limit, impact strength and torsional characteristics. These tests are made on the common metals, the emphasis being chiefly on the method rather than on the material tested. Some lubricants are tested.

Management. This course, following the courses in psychology and economics, is planned to give the student an all-round view of industrial organizations. The various departments or functions of management are studied separately and the students are required to read from management literature and to report their observations in the plants in which they work. Line and staff control, maintenance, inspection, design, and scheduling are examples of the material covered.

Tool Engineering Costs and Control. This is a course in the practical economics of tool engineering—a thorough study of tool engineering methods and factors from the standpoint of how they affect the overall cost of production. Included in the course will be studies of such items as the storage and control of tools, depreciation of tools and machines, comparative productivity and costs of different tooling and fabricating methods. Comparisons will be made of new equipment to be purchased as against cost of possible changes that would make present equipment suitable. The cost of maintenance and repair of tools and machines will be studied. Inspection methods and inspection costs will be included.

Process Engineering. Further instruction will be given in the planning of operations, analyzing the sequence of operations and selection of machinery, equipment and tools to be used. It will also instruct the students in dimensional control in machining operations, specifying the amount of material to be removed, and balancing dimensional tolerances for each machining operation. Practical production and tool problems will be thoroughly discussed together with tool and operation costs.

The writer desires to acknowledge the help given by Dr. Leo F. Smith, Associate Director of Educational Research, Rochester Institute of Technology, in the preparation of this article.

By J. C. Cotner

Elements of Pneumatic Installation

An outline of important factors involved in installing pneumatic equipment and distribution lines

COMPRESSED air is an important servant of modern industry, serving in numerous capacities and eliminating considerable effort and time. The average modern plant has an abundance of compressed air, generally available at around 80 p.s.i. pressure, and piped throughout the plant for many uses. Among these uses are the operation of hoists, elevators, chucks, clamping fixtures, drills, riveters, grinders, and presses.

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Installation of the compressed air system should be made with care, locating the air compressors and main receiver as closely as practical to a central point of distribution. Thereby, the greatest economy of distribution is effected. The air receiver should be of ample capacity to avoid pressure fluctuation, and to eliminate, as much as possible, condensation. The main air distributing lines should be of ample capacity to reduce friction losses and to provide carrying capacity of an ample supply of air to all points in the plant. Feeder lines coming from the main line to various departments, and to devices to be operated by air, should be carefully installed. All joints should be tight, with a minimum of elbows and fittings in order to avoid friction losses. Pipes and fittings should be of ample capacity to operate the devices to which they connect.

Removing Condensation

Condensation in the air distribution lines of an air system should be taken care of by providing a suitable means for draining. On the main air receiver, a drain outlet should be provided in the bottom of the receiver and opened frequently to blow off all sediment and condensation. Likewise, means should be provided at the end of the main air distribution line for removing the condensation that will accumulate. It is desirable that all main distribution lines have a gradual fall so as to flow the condensation to the end of the line for drainage. Naturally, the drop should be in the direction of air flow. Drainage of condensation can be manual, but there are devices on the market which will automatically blow off condensation as it accumulates and rises to a fixed level.

Feeder lines from the main distribution line can be equipped with air reducing valves, thereby reducing the air pressure to a particular feeder line in relation to the main line. This is frequently required as some operations require a lower operating pressure than others. Reducing valves are standard commercial items and can be adjusted to whatever pressure is required.

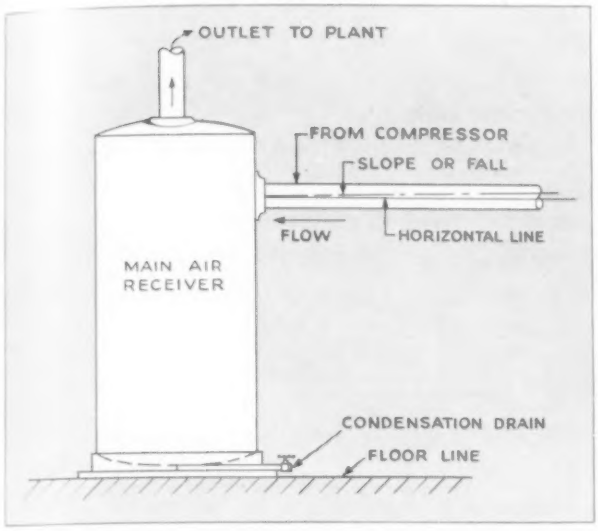


FIG. 1. Simple installation of main receiver.

The main distribution lines leading from one building to another, which may be exposed, and especially where located in cold climates, should be insulated against cold to avoid freezing of the condensation. If this precaution is not taken, condensation will freeze, building up to where it will seriously clog the line and reduce the free flow of air through it.

The manufacture of compressed air costs money, and the investment should be protected by checking all lines and air operated tools to avoid leakage or loss of air. A good time to check lines and equipment is when the plant is idle, so that you may either hear the escaping air or, by the use of some fluid, check the joints and the tools to see if leakage exists. All air operated tools are provided with adjustments to avoid leakage.

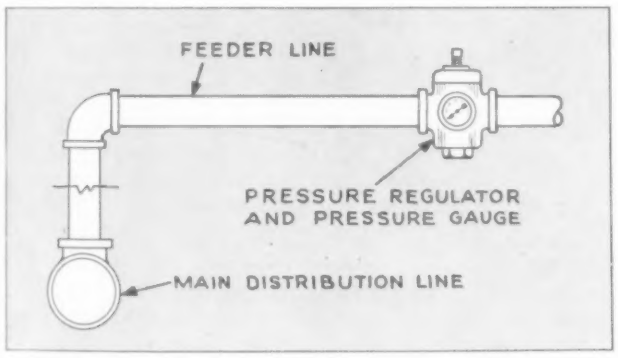


FIG. 2. Feed lines should be above main distribution line.

Referring to the rather elementary illustrations, Fig. 1 shows the installation of the main receiver, where it is indicated that the air inlet should be near the top of the receiver and likewise the air outlet at the top. This piping arrangement is provided to permit the condensation to collect in the bottom of the tank, and not be carried out through the distribution lines to the tools operated by air. The main air receiver should be placed as far from the compressor as practical, so that the temperature of the air can be reduced entering the receiver.

Fig. 2 shows the method of taking the feed lines from the main distribution line. Note that the connection is at the top of the main distribution line, so that all condensation that may collect in the main distribution line will not be carried out through the feed lines. In the same sketch is illustrated the application of an air reducing valve and pressure gage for the regulation of pressure in the feed lines.

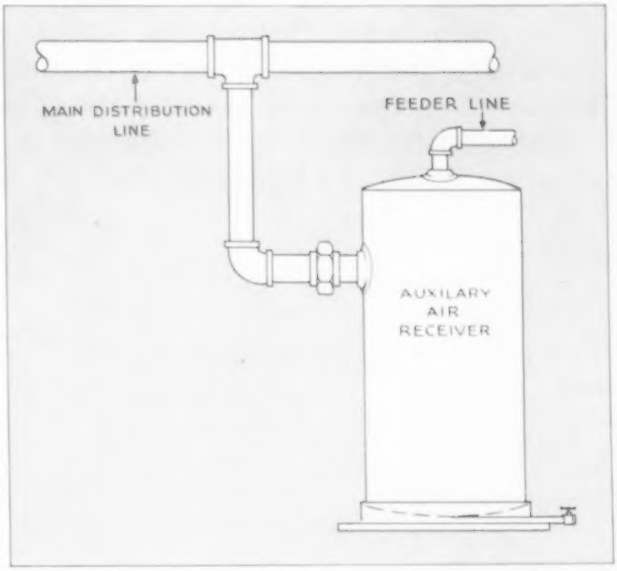


FIG. 3. Auxiliary receivers are used to eliminate pressure fluctuation.

Fig. 3 shows one of several auxiliary air receivers placed throughout the system, to act as auxiliary supply to the main receiver. They tend to eliminate pressure fluctuation, as well as to collect additional condensation and to keep such condensation from carrying through the main distributor and feed lines.

If the intake of the air compressor is taken from outdoors, it should be well protected and screened from dirt, rain etc., so that only clean fresh air will be drawn into the compressor. This will reduce wear and damage to cylinder walls and moving parts, as well as providing better air supply for the plant.

More Cemented Carbide Cutting Tools Needed

At a recent meeting, stepped-up requirements of cemented carbide cutting tools for the machining of shells and Navy rockets were brought to the attention of the Cemented Carbide Manufacturers Industry Advisory Committee, by the War Production Board. John S. Chafee, Director of Tools Division, presided for the Government.

It was brought out that fourth quarter shipments, 1944, were valued at about $9,000,000 for all products. These included tool blanks, dies, mandrels and shell cores for domestic, foreign and Lend-Lease claimants. Orders for turning tools totaled $5,752,000, with unfilled orders amounting to almost $2,000,000— an ordinary month's shipment. It was suggested that expansion of the industry may be necessary to meet further requirements.

In discussion, by members of C.C.M.I.A.C., it was suggested that a 50 per cent saving in cemented carbide tools could be effected by better tool usage.

National Committee Reports

Committee Reports Show Successful Year, Record-Breaking Membership, Ambitious Plans for Future

Meeting in Detroit March 23-24, 1945, the Board of Directors and officers of A.S.T.E. conducted a streamlined annual meeting to comply with constitutional requirements. As members had been advised, by mail and in previous issues of The Tool Engineer, it was decided to hold this Directors' meeting in place of the annual members' meeting previously scheduled. Reports of officers and committee chairmen are highlighted below.

National Secretary

A review of the twelve months just closed shows many changes in the development of our Society. The Organization Progress Committee has offered the means, through the proposed revisions in the Constitution, to return to the fundamentals of the Society as originally intended. The Finance Committee, recently appointed, has prepared recommendations for the guidance of our Society's financial affairs. We have, because our former publisher declined to renew his contract of ten years standing, found it necessary to put the Society into the publishing field in order that our members may have the official journal of the Society. We have begun the work of assembling material for the Tool Engineers' Handbook, long discussed but now much closer to realization.

E. V. Johnson

Ten meetings of the Executive Committee were held during the year, five of the Organization Progress Committee, one of the Education Committee, one of Finance, one of Standards, three of Editorial, and many other conferences relating to Society affairs.

The National Headquarters offices were moved November 1, 1944, to the downtown business district. Reports indicate that efficient layout has been helpful in expediting the routing of operations and that many members passing through Detroit have found it practicable to visit Headquarters and become more familiar with operations.

Total membership as of March 15, 1944, was 15,647. A year later as of March 10, 1945, it has increased to 18,086. Members in the Armed Services of the United Nations have increased from 658, a year ago, to 1,173 today. A year ago, 9,825 members were in good standing having paid their current dues—today, 11,351 stand in our books with a clear record. During the year, the following changes took place in our membership status:

New Members added	3,528
Reinstatements	46
Removed from Membership	1,135
Total net gain in Membership	2,440

Executive Secretary

In addition to reporting in detail the work of various headquarters activities such as the Bookkeeping, Membership, Address Change, Mail, Handbook, and "Tool Engineer" departments, the report of Executive Secretary Adrian L. Potter stressed the need for greater co-operation between the Chapter officers and the Public Relations and Program departments.

A. L. Potter

Keeping up a continuous drive for Chapter news and for more complete and more prompt reports of activities, the Public Relations department needs more photos, stories and biographical sketches of Chapters and individual members for use in the A.S.T.E. News.

The Program department, which was a part of the Chapters Service Bureau from 1942 until November, 1944, has issued a portfolio of films available to Chapters, compiled a list of speakers who are well qualified to present interesting and educational talks to Chapters, and has co-operated with many Chapters in arranging programs. In December, 1944, this department began a survey to determine the quality of many speakers at Chapter meetings and to learn the value of the subjects presented. A questionnaire for this purpose was sent to all Chapter Program Chairmen on January 24, 1945, but only 40 have submitted returns. Co-operation of other Chapters in completing this survey will help materially in improving Chapter meetings.

A. L. Potter, *Executive Secretary*

MEMBERSHIP ANALYSIS

Senior	13,364	
Junior	3,534	
Total paying Members		16,898
Life & Honorary	15	
Armed Service	1,173	
Senior (310)		
Junior (830)		
Student (33)		
Total non-paying members		1,188
TOTAL MEMBERSHIP		18,086

Earl V. Johnson, *National Secretary*

National Treasurer

The cost of operating your Society continued to mount during 1944 due to the tremendous expansion experienced, wartime conditions, ambitious programs, higher labor and material costs and extraordinary legal and travel fees involved in taking over THE TOOL ENGINEER. This condition was further affected by the following financial conditions:

Armed Service dues absorbed	$ 5,285.50
Extraordinary Legal & Professional Expense	697.76
1943 dues delinquency charged off	10,824.00

These conditions, while distressing, were unavoidable and are still going to be with us this year. However, since the Finance Committee is now functioning on equitable budgeting for the coming year, such situations should be greatly minimized if not entirely eliminated.

F. W. Eaton

With reference to the tremendous expansion mentioned above, there were seven (7) new Chapters chartered and a total net increase in membership from all sources of 2,308 as against 3,219 in 1943. This expansion of course affected Headquarters operating expenses measurably.

During the year, the cost of new equipment purchased totaled $1,034.13. In 1943, this cost was $3,291.91 and in 1942 it was $4,492.54. Therefore, it is apparent that everything possible was done to keep our capital investment to a reasonable minimum. The total cost of capital assets such as furniture, fixtures, and business equipment to date is $11,795.25 and, less standard depreciation, is now worth $8,544.90 in book value. According to best accounting practices, all equipment purchased in the future will be expensed and charged off completely in the year it was purchased.

F. W. Eaton,
National Treasurer

Membership

This committee compiled a nine-point guide on handling of membership applications which was sent to all National Officers, Directors, Chapter Chairmen, Secretaries, Treasurers and Membership Chairmen on November 29, 1944. Applications are now coming in with more information and more Chapter recommendations to help in grading them.

V. H. Ericson

Membership in the A.S.T.E. as of February 28, 1945, was 17,918, an increase of 2,498 members since February 10, 1944.

Since the 1944 annual meeting six new Chapters have been chartered at Springfield, Ill., Niagara District(St. Catherines, Ont.), Richmond, Ind., Flint, Mich., Pontiac, Mich., and Muncie, Ind. Chartering of another new Chapter at Phoenix, Ariz., scheduled for February 22, was postponed until April 26 because travel difficulties prevented President D. D. Burnside making the earlier date.

The Membership Cup Race, which created considerable interest, was won by Fond-du-Lac Chapter with a score of 2999.996. Twin States was second with 2999.962, and Central Pennsylvania third with 2922.04, using the same formula as in previous years.

V. H. Ericson
Chairman

Receipts and Expenditures

Summarized from a report by John H. Doyle, Certified Public Accountant, the Society's receipts and expenditures for 1944 were:

RECEIPTS JAN. 1 TO DEC. 31, 1944

Cash on hand and in banks, Jan. 1, 1944		$ 15,167.31
(See note below regarding investments in Bonds)		
Dues and initiation fees	$117,403.86	
Less refunds	$ 1,759.75	
Less payments to Chapters	25,778.37	
	27,538.12	
Net collection of dues and initiation fees		89,865.74
Refunds received	3,457.27	
Interest received	486.04	
Receipts from Society functions	10,925.00	
Miscellaneous receipts	4,616.75	
		19,485.06
Total funds available		124,518.11

EXPENDITURES JAN. 1, TO DEC. 31, 1944

Total disbursements	$113,068.39
Cash on hand and in banks, Dec. 31, 1944	$ 11,449.72

Note—As of December 31, 1944, and including a $5,000 Canadian bond purchased in 1944, the Society's total investment in bonds represented a maturity value of $36,000.00 and current market value of $35,135.65, with accrued interest of $1,000.00 and interest received of $2,454.37.

Public Relations

The Committee particularly commends the officers of our Society, the Executive Committee and National Headquarters for their good judgment, speed and tact in handling the postponement of the Machine & Tool Exposition. The Committee believes it was good public relations to decide to postpone the Exposition. It was good public relations to speedily advise exhibitors and other vitally interested with regard to the postponement. This Committee also wishes to congratulate our National Officers, the Chairmen of all National Committees, the Chairman of the Educational Committee and the Editorial and Business Personnel of The Tool Engineer for their combined efforts in successfully launching the first issue of the A.S.T.E.'s own Journal under difficult conditions.

A. F. Denham

It is our belief that the major responsibilities of the National Public Relations Committee should properly be the function of the Executive Committee. The Committee appreciates the many duties for which the members of the Executive Committee are responsible and is not desirous of suggesting an addition to that burden. It is the belief of the Committee, however, that if more and more of the *mechanics* of the administration could be handled by the paid headquarters staff, the Executive Committee would be able to devote more time to the reviewing of actions of the various Committees and the headquarters staff from the standpoint of long range good public relations inside the A.S.T.E. and out.

The major responsibility of the Committee has been to be on the alert to detect any trend, incident, comment, or criticism that might be detrimental to the Society or its members.

G. J. Hawkey

The Committee is fully cognizant of the fact that in *any* organization there is room for improvement from a public relations standpoint. It is this Committee's function to be "critical" of course, when necessary to correct "bad" public relations. Nevertheless, we believe it is also the Committee's function to recognize and point out for the benefit of others, A.S.T.E. activities which are outstanding from a "good" public relations standpoint.

G. J. Hawkey,

A. F. Denham

Co-Chairmen

Industrial Relations

The primary objective of the National Industrial Relations Committee during the past year has been (1) to interest the various chapters in maintaining a closer relationship with leaders of industry within their districts, (2) to foster the scheduling of at least one "Executives Night" program in each chapter, and (3) to foster a closer, more personal relationship between the individual members and their Society, the American Society of Tool Engineers.

B. C. Brosheer

In July, 1944, a long letter was sent to each chapter chairman of the Industrial Relations Committee, to each chapter chairman, and to the area vice-chairmen of the National Industrial Relations Committee, outlining a broad program and requesting cooperation within the individual chapters. That this program has been successful, to a degree, is emphasized by reports received from 26 of the Society's 70 chapters.

I am recommending a study by the National Executive Committee, the Organization Progress Committee, and by the Board of Directors of these reports. Experience emphasizes the need for a handbook on chapter activities which was recommended last year in the report of the National Industrial Relations Committee.

However, I am happy to report that a good many chapters incorporated "Executives Night" programs in their schedules and that many of them have reported good results from these programs.

It is essential that more emphasis be placed on developing the active interest of individuals in the activities of their chapters and in the activities of the National Society. Anything which can be done to foster this interest will, of course, result in great benefits to the Society and, in turn, to the individual members. I urge that a definite objective of the National Society for the coming year be made the development of a program which will result in greater interest among the individual members of the Society.

Ben C. Brosheer,

Chairman

Handbook

Mr. Frank W. Wilson started his work as Editor on January 2, 1945 with offices at National Headquarters. At his request, a meeting was held at the Hotel Commodore, New York City, February 16 and 17, to discuss the objectives, overall structure and detailed contents of the Handbook and the selection of distributors, together with the policy to be followed as to their use. Messrs. E. W. Ernst, Chairman, F. W. Curtis, R. B. Douglas and F. W. Wilson were present. The conference showed considerable progress had already been made in the preliminary planning and groundwork of the Handbook, and as a result of the many decisions made and the policies tentatively set, actual compilation can now go forward rapidly.

E. W. Ernst

Objectives

Mr. Wilson offered the following as definite objectives for the Handbook:

1. *A Reference Work:* Not a textbook, airing hypotheses and opinions; not a data-book repository for minor notes.
2. *Comprehensive:* Covering, in some degree, every activity in which the Tool Engineer makes or influences a decision.
3. *Professionally Arranged:* Data arranged according to professional outlooks—not from a single machine, product, or operational point-of-view.
4. *Authoritative:* Best contributors and checkers available; data, within reason, based upon ASA and other established standards.
5. *Modern:* Emphasizing new, vital data not yet brought into any other handbook.
6. *Independent:* Data incorporated strictly on its merits——not just because another handbook gives it.
7. *Educational:* Needs of novices considered in selection and treatment of data.
8. *Salable:* Data added, in excess of the Tool Engineer's strict needs, and so arranged as to appeal to general executives and others.
9. *Neutral:* Facilitating the *use* of, but not pushing the *sale* of, any make of equipment, materials or supplies.

Structure: The Committee was in approximate agreement that careful grouping and sectionalizing of Handbook data was of great importance, both for easiest reference and maximum book salability. The following general classifications were agreed upon:

1. Product Design in Relation to Tool Engineering.
2. Tool Engineering Economics
3. Planning and Control of Production
4. Production Equipment and Operations
5. Plant Layouts and Services
6. Workability of Metal
7. Mechanical Design Elements and Standards
8. Mathematics, Physics, Tables and Symbols

Format: In discussng most advisable size of the Handbook, Mr. Wilson showed a layout suggesting a type page of 5-1/4" x 8-1/4" high, with a trim page size of 6-3/8" x 9-1/4" high. This was recommended as a compromise to permit maximum printing economies. Also, this size cuts with minimum waste from standard paper sizes.

It was agreed that above sizes—increasingly common on modern handbooks—should be settled upon for Tool Engineer's Handbook.

E. W. Ernst,
Chairman

Standards

E. E. Griffiths

The plan as outlined by the Organization Progress Committee will be of great assistance to all office holders of our Society, namely that "yearly each newly elected officer and committee chairman, either national or chapter, will receive with his vesture of office a booklet or ritual which should, if properly prepared, answer fully all questions and problems of operation for his particular activities."

Indexing

In reference to securing an indexing system for our data sheets I approved the method proposed by Mr. Thomas, copies of which were mailed to all interested for their comments, criticisms, or approval. Believe it or not, only three replies have been received. One was very much opposed; two were heartily in favor. But I ask why the negligence on the part of those receiving these communications and not replying, especially when the subject of indexing at this time is very important.

I have in my file at least one dozen indexing proposals dating back to early in 1943. This subject was also discussed at the Syracuse Meeting. Quite a number of our Westinghouse engineering members of Chapter No. 8 have been interviewed on Mr. Thomas' method and they have given their approval. All interviewed stated that the data sheets give very valuable information but as they all say, try and find it —without an index. They also stated that they prefer the functional and dimensional data to the photographic type; and that these engineering data sheets for information on tools, machines and materials stimulate research and make for the elimination of antiquated methods and materials. It also facilitates design and development work as well as helping to reduce the cost of materials and labor.

Initiation of a Standard

Any responsible body such as our American Society of Tool Engineers, may request the initiation of a project to the standards council of the A.S.A. for standardization, or for revision of an existing standard. If the A.S.A. approves them, a committee is organized by the sponsor in cooperation with the association. To date I have not had any requests for the initiation of any standards to be presented to our A.S.A. representative. In this respect, I am of the opinion that our "Tool Engineer" magazine could be of a great assistance in helping to promote this activity.

Standards may include some of the following:

Uniformity in dimensions to provide interchangeability

Specifications for materials and products

Safety Standards

Standard ratings for machinery

Standards for tests or inspection

Standard rules for operation of machinery

Concentration for least number of types

Tools, dies, moulds, etc.

Generally, there are three ways of using a standard:

First—A standard may stand as advice or as a recommendation to industry, any company having complete freedom to use it or not.

Second—A standard may be mandatory by some government agency, Federal, State or Local, having the legal authority.

Third—Parties at interest may enter into an agreement as to the use of the standard.

Most standardizing bodies operate their standards in the first of the above three methods.

Advantages of Standardization

The following is but a partial list stating some of the advantages of standardization:—

1. It sets up a uniform system for everybody to use.
2. It guides those concerned with specifying, requisitioning, purchasing, stocking, and inspecting materials.
3. It permits the specification of materials on drawings in such a manner that changes in them will not require changes in drawings.
4. It permits the exercise of proper control over the quality of materials.
5. It establishes standards of quality and effectiveness of the finished product.
6. It confines use of materials to as few as possible, based on functional requirements rather than individual preferences.
7. It simplifies records kept throughout the company as there are fewer types, sizes, etc., to be recorded.
8. It avoids lost motion and confusion in requisitioning and purchasing of materials.
9. It permits the purchasing of fewer items in greater quantities for best ecenomy.
10. It reduces the amount of capital tied up in inventory.
11. It simplifies storage.
12. It reduces manufacturing costs.
13. It shortens fabrication time.
14. It eliminates duplication of effort.
15. It eliminates waste.
16. It facilitates design and development work.
17. It stimulates research and makes for the elimination of antiquated methods and materials.
18. It reduces cost and time of instruction of new employees.

E. E. Griffiths,
Chairman

Editorial

C. V. Briner

This committtee was appointed and started to function after all arrangements had been made to publish the February issue of the *Tool Engineer*. We learned then that our application for a paper quota had been denied by War Production Board and that we were arranging to publish under a special ruling which had been issued by War Production Board for another Michigan organization.

Immediately upon the appearance of our first issue, War Production Board wired that we were in violation of their Publishers' Order L-244 and Commercial Printers' Order L-241, and that they had no knowledge of the special order above-referred-to.

Since that time this special order has been rescinded, permission has been granted to the American Society of Tool

Engineers to publish a so-called house organ, and the Society has prepared an appeal for a paper quota. This house organ was issued as our March number of the *Tool Engineer*, in which we were not permitted to sell advertising space.

C. V. Briner
Chairman

Editor's Note: The rest of Mr. Briner's report dealt with the Society's paper problem. Since the report was given before the Board, the Society was given a magazine paper quota sufficient to produce *The Tool Engineer* of the size and editorial content this publication was originally planned.

Constitution and By-Laws

This Committee has, during the past six months, taken the first step in processing the Constitutional changes recommended by the Organization Progress Committee. The voting on this matter by the Chapter Constitution and By-Laws Committee was completed recently, and they have voted by an overwhelming majority to refer the Constitutional changes to the Membership for their consideration. The final closing of the ballot on this matter will take place sometime in April.

I. F. Holland

Under our present Constitution and By-Laws, the voting on the By-Laws is a prerogative of the Board of Directors, and the National Constitution and By-Laws Committee recommend that the directors be asked to vote on the acceptance of the By-Laws by letter ballot when, as, and if the Membership have accepted the proposed Constitutional changes.

Irwin F. Holland.
Chairman

Program

The National Program Committee, after surveying the material available to Chapter Program Committees, found that the lists of speakers were scattered and ineffective, and also that many of them were obsolete. For this reason the Committee decided to attempt to bring up-to-date all the accumulated information and compile a revised speaker list which would give complete and centralized information to Chapter Program Committees.

L. J. Radermacher

This work is now under way and the first list of proposed speakers has been circulated to the various Chapter Program Committees with instructions to check and report on all speakers on this list with whom they have had experience, and to advise their opinions of the suitability of the subject and the speaker for other A.S.T.E. Chapters. This information will be tabulated and undesirable items eliminated, after which a check will be made with all the desirable speakers to determine their availability, the territory in which they will be available and other information which the Chapter Program Committees require.

When completed, this list will greatly simplify the matter of selecting suitable speakers. It should be emphasized, however, that this should be a continuing process whereby new talent, as soon as it is recognized, would be made available to all chapters. It is expected that the first list will be submitted to the Chapter Program Committee Chairmen the latter part of April or early May, and additions will be made thereto as frequently as possible.

L. J. Radermacher,
Chairman.

Education

A "Proposed Outline of Activity for Chapter Education Committees" has been sent to National and Chapter officers for comments and suggestions.

O. W. Winter

Survey is to be made to determine the extent and nature of educational work being done by the various Chapters.

In the tool engineering literature field, Volume I of "Elementary Jig and Fixture Design" is now on the press, and Volume 2 will appear in about six months. The committee is co-operating with several publishers and qualified writers in the preparation of other text books.

Preliminary results of the survey to determine industry opinion of tool engineering education were published in the March issue of The Tool Engineer. Chapter co-operation is needed to improve the mailing lists for continuation and expansion of this survey.

Ohio State University has a committee studying the introduction of a tool engineering course in their curriculum. A survey is to be conducted jointly by the University and A.S.T.E., similar to our industry opinion survey, and if results are favorable the University is ready to take action.

Further A.S.T.E. help is needed in encouraging financial support from Ohio industry, and if possible in establishing a professorship and some scholarships.

Purdue, Michigan, and several other universities and engineering or technical colleges have expressed interest or are definitely considering tool engineering courses.

Rochester Institute of Technology has established a three year co-operative course, to start next September. This was reported upon in the March issue of The Tool Engineer.

New York State's Education Department is establishing for postwar a number of technical institutes between high school and college levels. Plans are to include tool engineering subjects and courses.

Apprenticeship activities of this committee and A.S.T.E. Chapters were reported in detail in The Tool Engineer, March issue. Opinions on our future course in this program have been requested, and will be used as a guide in shaping our program in this important work.

The field of dignified professional activity that education offers A.S.T.E. is only beginning to unfold. War busy members have had little time for such thought, but indications are that this is changing.

A.S.T.E.'s contribution to tool engineering education is dependent upon member interest and financial support. With adequate backing in these respects we can accomplish much more than we already have.

O. W. Winter
National Chairman

By Fred C. Hebert

Simple and Compound Hydraulic Circuits

A sequel to the article published in the March issue of The Tool Engineer. Simple and compound circuits as applied to the production tools of today

IN GENERAL, hydraulically actuated machinery is controlled by one of three methods:—Manually, mechanically or electrically. Manual control may vary, but is usually confined to only two phases:—directional control and pressure control. See Fig. 1, which outlines a simple circuit.

Here, hydraulic pressure is generated by a two stage pump, delivering about 200 p.s.i. at low pressure and 1000 p.s.i high pressure. Pressures are adjustable. A simple valve —in this case a standard manually operated pilot valve—diverts pressure from low to high, or vice versa, at the discretion of the operator. Direction of travel of the piston is controlled by a manually operated, standard 4 way valve.

Fred C. Hebert, **president of the Hebert Equipment Company, is a member of Detroit Chapter, A.S.T.E. He is a veteran tool engineer who, for a number of years, has specialized in the design and manufacture of hydraulic equipment.**

However, pressure boost and drop can be entirely automatic, in which case the pilot (or pressure) valve is eliminated and the high pressure line connected directly to the pressure line leading into the cylinder. As the ram meets resistance, pressure builds up and remains constant until the flow is reversed, when it immediately drops to low. Of course, even directional control can be automatic, as will be shown later.

Mechanical and Electrical Controls

Mechanical control is usually by means of dogs or cams, mounted on moving parts or slides, which may directly actuate cam operated 4 way valves. Preferably, however, the 4 way valves are controlled by pilot valves which are tripped by the to and fro travel of the dogs. Mechanical control works equally well on reciprocating or rotary motions.

Electric control is by means of mechanically or manually operated switches which, through solenoids, control the hydraulic valves in the circuit. This may be a simple, single cylinder circuit such as an assembly press where, at the lower point of travel, a dog on the ram will actuate a switch, causing reversal of the circuit and raising the ram. Or, it may be an involved circuit, with a multiplicity of cylinders and varied sequences.

This principle is illustrated in a simple "cascade" circuit, (Fig. 2) where electric controls, with electric timer control units, are used throughout. In this type of circuit the electric control can also be arranged for set-up purposes, where each movement can be controlled separately.

This automatic circuit (shown) has the following sequences: When the cutter head retracts, it actuates switch "A" which reverses valve 3. Contact on switch "D" energizes solenoid in valve 1, moving work carrier to left. This then makes contact with switch "C" at instant of contact with adjustable stop. (In practice, the two are incorporated in one unit). Switch "C" energizes valve 3, clamping the workpiece.

Movement of the clamp actuates switch "D" energizing valve 4 and starting cutter head down in rapid traverse. The cam operated 2 way valve (designated as shut-off valve) is closed at a proper point, when the oil is metered for the desired feed.

Actuating switch "D" on clamping stroke (lower cylinder, directly under spindle) also energizes valves 1, and 2, causing work clamp on work carrier (lower cylinder, at left) to open. Here, however, an electric timer in the circuit delays action of valve 1 until the work carrier clamp opens. Action of valve 1 returns carrier to right against a permanent stop.

Operation Can Be All-Automatic

When working stroke of the cutter head is completed, switch "B" is actuated by the lower dog (shown at left of cutter head) which then returns the cutter head to starting position, at the same time clamping the workpiece on its carrier. If set on automatic cycle this sequence is repeated.

While the foregoing may seem involved, a little study will resolve it to comparatively simple elements. Actually, the work consists of strip stock which is progressively fed and positioned under the cutter head. The clamp cylinder, lower left, moves the strip to the left at each movement of the slide, which is moved by the cylinder shown at extreme left.

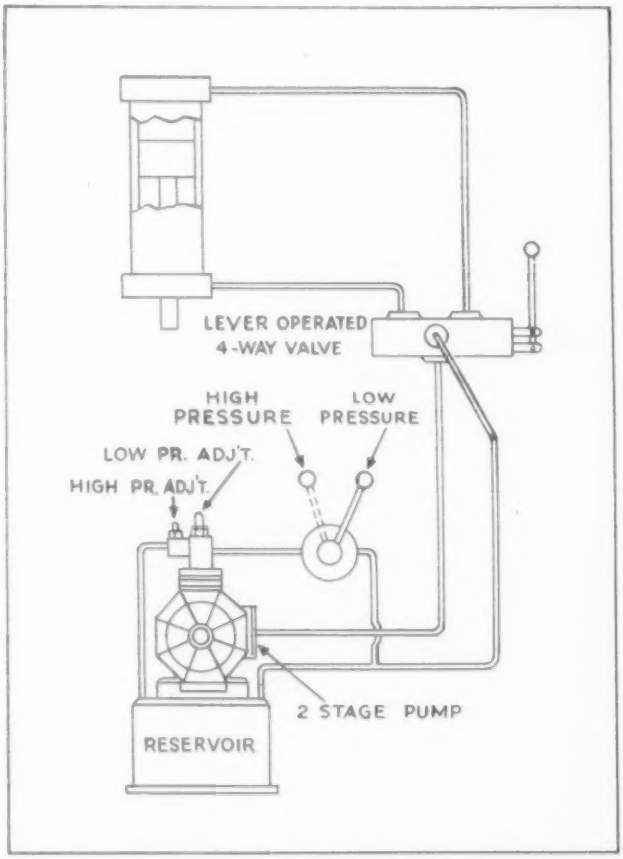


FIG. 1. A simple circuit, with manually operated valves for high and low pressures and directional control.

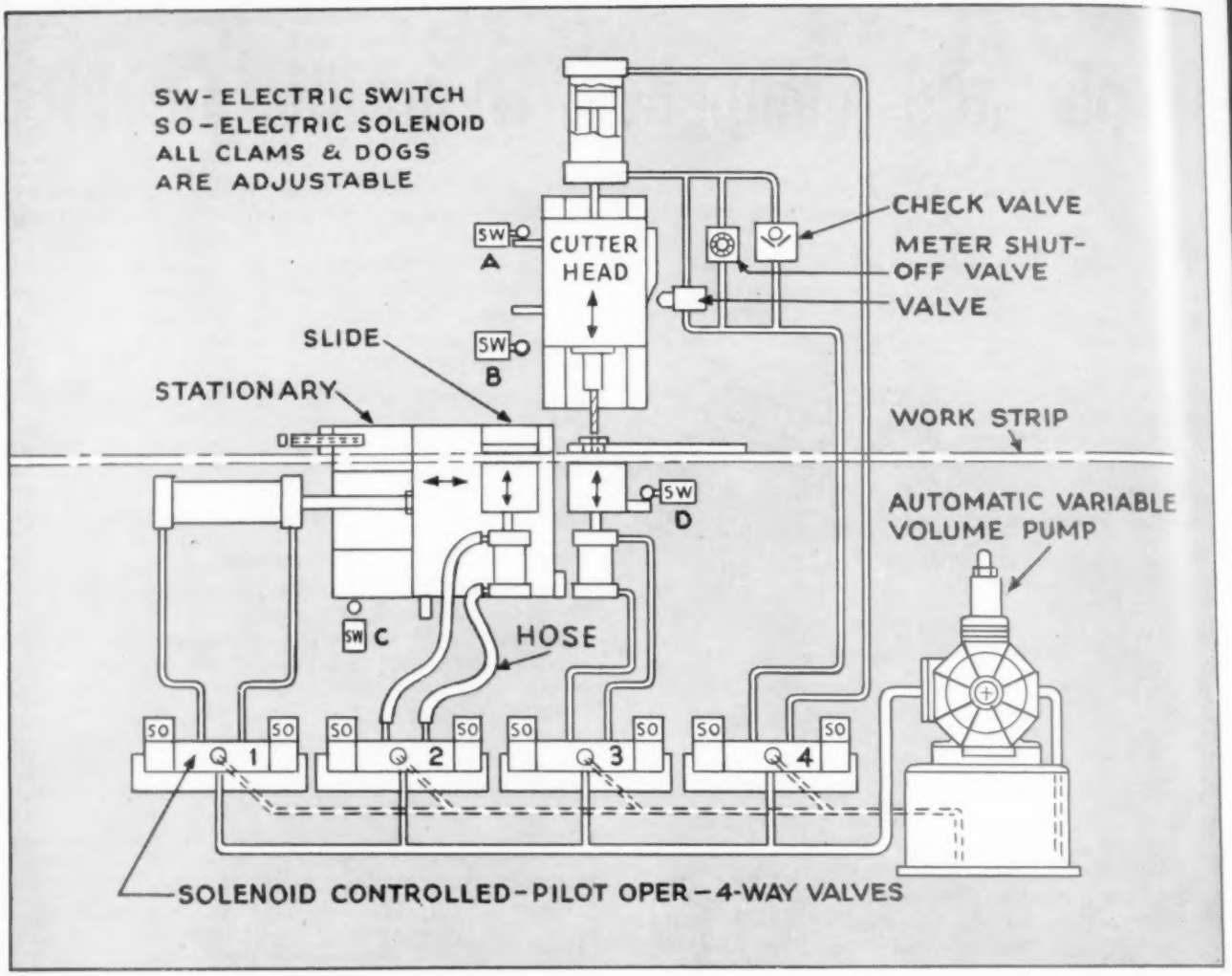
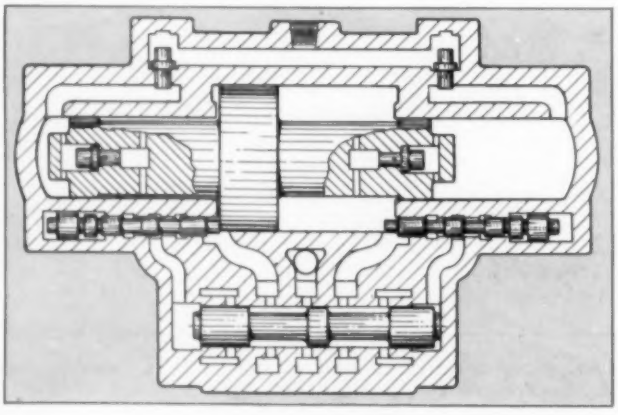


FIG. 2. A "cascade" circuit, combining mechanical and electrical controls. An ingenious arrangement that provides a full automatic cycle and progression.

Naturally, the work clamping cylinder (right), which acts in the dual capacity of clamp and thrust member, must open before the slide can move leftward. The sequence, then, is this: With the slide advanced (as shown) the left hand cylinder shuts, gripping the strip. It then moves leftward, against the adjustable stop, positioning the strip. The clamp cylinder then shuts, clamping the work. As the cutter head moves down, the left-hand cylinder opens and the slide returns (rightward) to starting posittion, and shuts. As soon as the cutter head retracts, the cycle is repeated, the whole as natural as sliding a piece of tape between ones fingers.

As a comparatively recent innovation in the field of hydraulics, the continuous booster, shown in Fig. 3 and which is operated from a low pressure pump, gives a constant

FIG. 3. The Racine booster. This device operates on low pressure and builds up pressures to 2000 p.s.i.



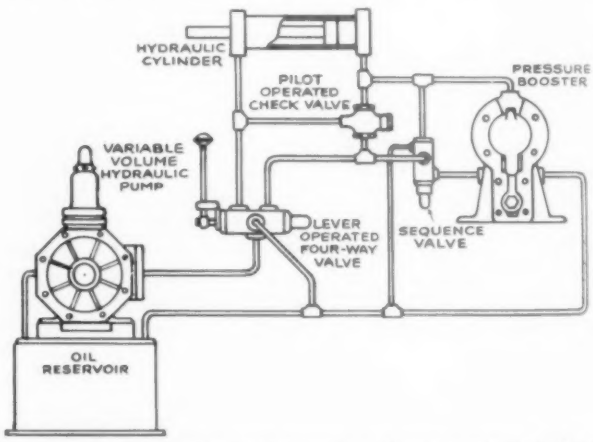


FIG. 4. Low pressure for rapid traverse and return; automatic high pressure for the work cycle.

supply of oil up to 3000 p.s.i. When incorporated in a circuit, such as is shown in Fig. 4, it provides low pressure for rapid traverse and return, and automatically builds up high pressure when the resistance is sufficient to open the by-pass or sequence valves. There is no valving at high pressure, thereby eliminating the wire drawing which often results when high pressures must be valved.

ring to this circuit, directional control is achieved by way valve. Rapid approach—or traverse—is through the operated check valve until the ram meets resistance. Then, the sequence valve opens automatically, allowing pressure oil to flow to the booster, which then supplies high pressure to the cylinder. The increased pressure causes the pilot operated check valve to remain closed during the balance of the work cycle—or as long as resistance p.s.i. is greater than the pressure for which the sequence valve is set. When the 4 way valve is reversed, the pressure on the operating cylinder in the pilot operated check valve (which holds the 4 way valve open) allows the oil in the blank end of the work cylinder to return directly through the 4-way valve to the supply reservoir.

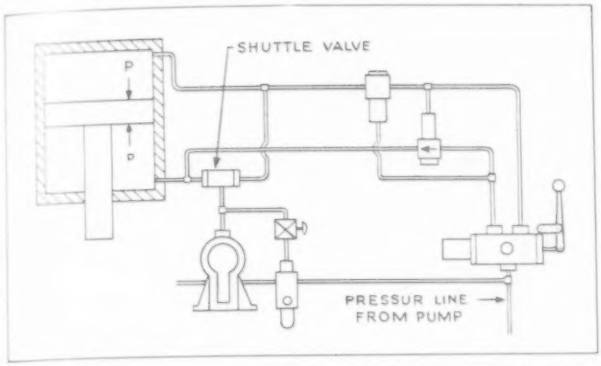


FIG. 5. Above—A shuttle valve in the circuit provides high pressure to both ends of the piston.

FIG. 6. Below—Racine vane type pump with single phase governor. Pressures are balanced.

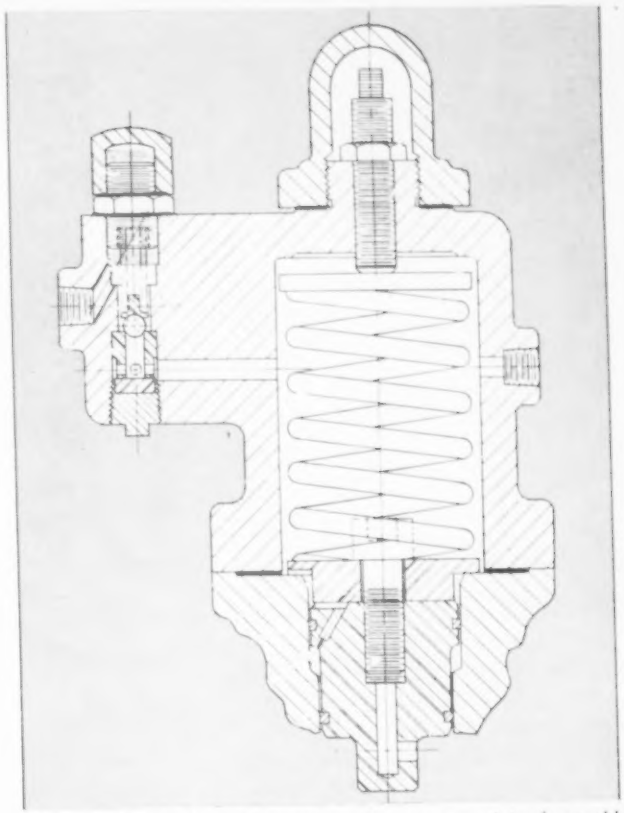
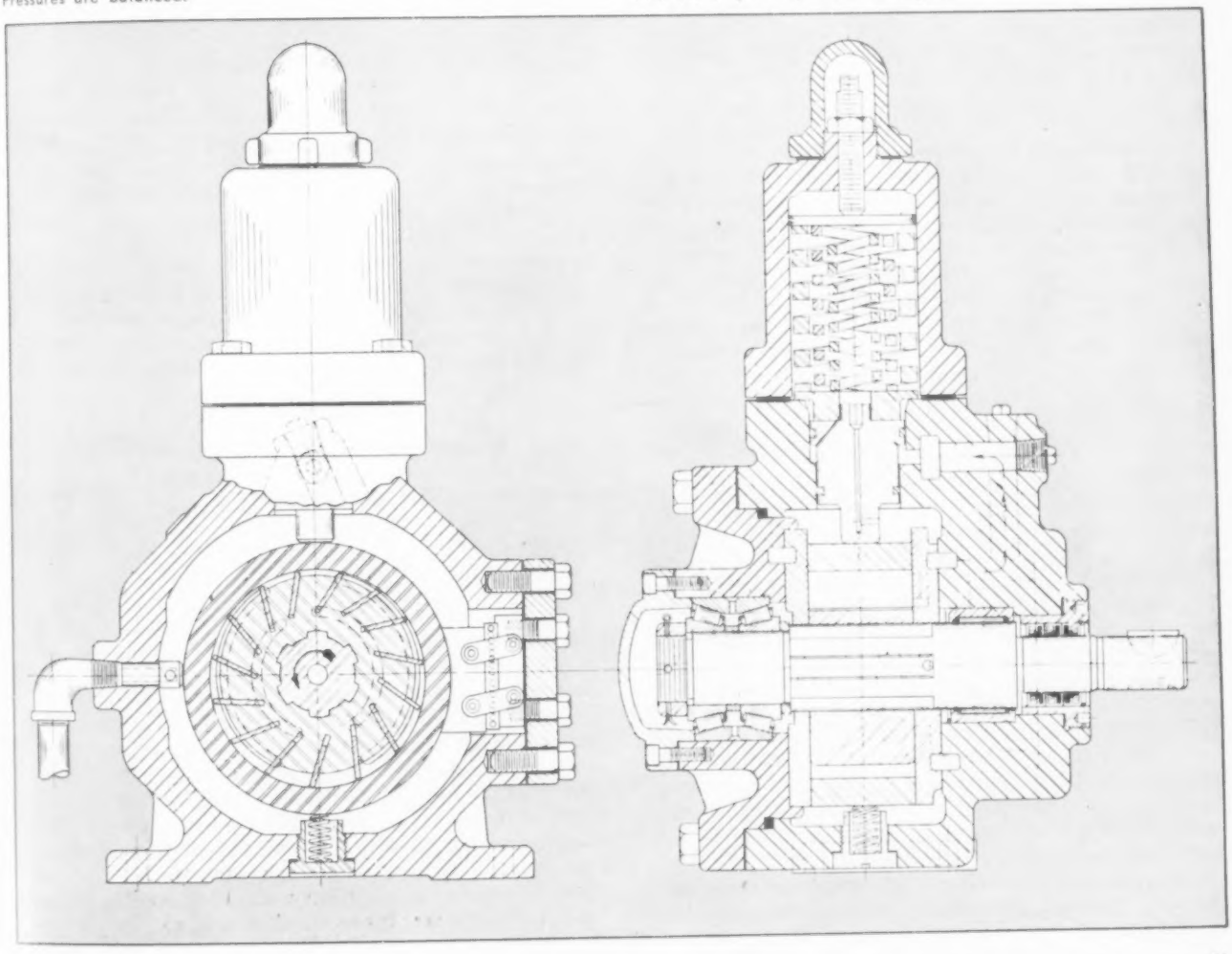


FIG. 7. Above—Two stage automatic governor, interchangeable with the simple stop shown in Fig. 6.



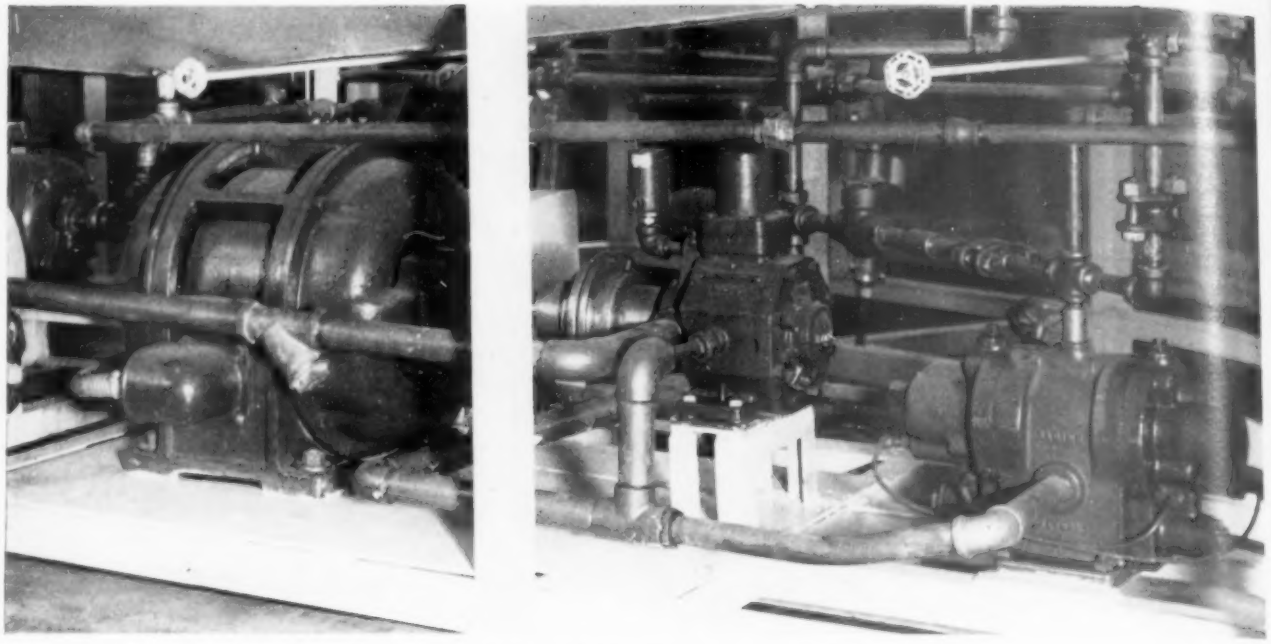


FIG. 8. Typical installation of Racine pump and booster. Control is remote.

When two way operation of a cylinder is required, with high pressure in both directions, an automatically acting shuttle valve (Fig. 5) is incorporated in the circuit. This, then, gives identically the same cycle as in the preceding circuit, but with high pressure in both directions.

Because of the rather novel operation of the pump, and the method of building up pressure, this is shown in section in Fig. 6. The pump is a rotary vane type, provided with an automatic, single stage governor. The latter, which controls volume, is actuated by resistance pressure.

Pressure Varied Automatically

As pressure builds up in the circuit, this pressure is effective on the piston in the governor. The compression ring of the pump—i.e., the ring enclosing the vaned rotor—follows the piston as the latter rises. Then, as the piston compresses the governor spring, the volume is automatically varied.

When the resistance pressure equals the set pressure, the pump will "deadhead," sustaining the pressure but pumping no oil. This eliminates the need for a relief valve and also cuts down heat generation and the amount of power used.

The two stage governor, (Fig. 7), which is interchangeable with the single stage shown on the pump, works on the same principle. Practically, the only difference is that the spring chamber has a minute opening (shown at bottom, just left of the screw) which allows oil pressure to enter the chamber. This pressure is relieved by a drain to the reservior. Closing the drain line allows the oil pressure in the chamber to build to a higher pressure, which in turn is controlled by the high pressure valve in the governor head.

Fig. 8, shows a typical installation of pump and booster, together with in-line motor drive. Controls are remote, with pressure gauges, valves and other control units advantageeously disposed. All of the circuits shown are comparatively simple and have an infinite number of applications to modern hydraulic appliances and equipment.

Except for diagrams, which are the author's, photographs and sections are by courtesy of Racine Tool & Machine Company, Racine, Wisconsin.

Redraw to Increase Tool Life

Recently, a minufacturer was having trouble due to the chipping of forming dies. A service engineer, called in, recommended change of steel, whereupon the trouble vanished. Changing steel, however, is not necessarily the answer to such a problem, rather, one may as easily effect the desired results by a change of heat treating. Especially so, since, in these war times, one cannot always obtain exactly the desired material from which to make tools.

Often, it is desirable to draw and redraw steels, doubling and tripling and, in some instances, drawing five times. This is not applicable alone to high speed steels. As a recent example, steel stamps, which were used for marking code numbers on shells, were giving plenty of trouble. Made from straight carbon tool steel, and hardened to the limits, their maximum life was 40 shells, with the average far below that. Some failed before the 10th hit.

After some consideration and experiment, they were hardened to 62 Rockwell C, then highly polished. They were then drawn to a light straw, repolished, and again drawn, when the hardness remained as before—i.e., 62 Rockwell C. But, instead of failing on a few pieces, they lasted for 4,000 shells, and were still in excellent condition when the run was completed. Quite an improvement!

In another instance, a quantity of small chisels was used on metal which is extremely hard. The chisels failed repeatedly until, having been subjected to several draws, they practically stood up "for life."

Applying this method to dies which fail after limited runs, one allows the die to cool to comfortable handling temperature before reheating. Before drawing, however, it should be tested for hardness; then polished and drawn as described above. In this connection, a piece of steel can be drawn and redrawn repeatedly, provided a critical temperature is not exceeded, without changing its hardness. But, its structure is changed so remarkably that the repeated drawing means the difference between limited and extended life.

By William H. Oldacre

Machine Tool Lubrication

Increased production, higher quality, lower costs possible with correct lubrication, starting with machine tool design

FEW ELEMENTS in our modern industrial machine are as important as lubrication. Ever since some primitive individual discovered that certain substances lessened the drag between moving surfaces, the wheels and slides which contribute so much to our civilization have, progressively, been moving smoothly, quietly and with reasonable efficiency in spite of rather casual interest in the lubricants used.

The fact that, until recently, easily available lubricating materials met all the demands placed upon them has probably contributed to this lack of attention to an item so important. Today, however, wheels are moving faster and faster and carrying ever increasing loads, so that oils and greases must function under increasingly difficult conditions. Spotlighting this situation, have been comparatively recent developments in the automotive and airplane industry. Here, excess weight is recognized as costly and inefficient, and every effort is made to reduce mass and increase velocity and acceleration. It is not surprising, therefore, that many new developments in lubrication have been necessitated by the demands of these industries.

***W. H. Oldacre*, President and General Manager of D. A. Stuart Oil Co., has had twenty-seven years of experience with cutting fluids and lubricants. He is a member of many technical societies, and has spoken before many Chapters of A.S.T.E.**

The first, and perhaps the most important innovation, to call for improved oil was the hypoid gear. As is frequently the case, this new type of gear was actually built into cars and put in operation before it was discovered that no ordinary oil or grease would take care of it. More or less accidentally, it was found that certain unusual products containing sulphur would satisfactorily lubricate this mechanism.

Under the impact of this discovery, and the demand for large quantities of hypoid lubricant, several types of testing machines were developed and a great deal of interesting information was obtained. In fact, these admittedly crude extreme pressure testing machines have probably added more to our knowledge of lubrication than any other development. Increased requirements of heavy duty truck motors, diesel motors, and the airplane have brought new research problems and, regularly, we are arriving at helpful conclusions.

Additives Improve Certain Oils

Prior to the discovery that small amounts of sulphur increased the load carrying capacity of lubricants, it had been found that very limited quantities of certain compounds added to oils reduced their pour point. Later, it turned out that other properties are likewise affected by selected materials in low proportion, and since 1930 a large number of such additives have been developed.

Perhaps a discussion of these additives will give a convenient approach to consideration of lubricant functions. The following list is not complete but will serve the purpose.

1. Oiliness or lubricity improvers; 2. Extreme pressure, antiweld compounds; 2. Antioxidants—stability improvers; 4. Corrosion inhibitors; 5. Viscosity index improvers; 6. Pour point depressors; 7. Detergents; 8. Stringiness increasers; 9. Defoamers.

Oiliness or lubricity are the terms used to describe that property which distinguishes lubricants from nonlubricating substances. We are handicapped in our consideration of this property by our lack of knowledge as to what takes place between rubbing surfaces, although we easily speak of the result as friction and hide our ignorance with intricate formulation. It is easily observed, however, that some substances introduced between bearing surfaces have a much greater effect than others in reducing resistance to motion. Such substances are said to possess oiliness or lubricity.

Petroleum Vs. Animal and Other Oils

Animal, vegetable or marine fats and oils possess this quality to a much greater degree than do petroleum oils. Were it not for the fact that petroleum oils are much more stable it is probable that the fats would not have been so easily replaced in the realm of lubrication. As it is, it has long been customary to add small quantities of fat to cylinder oils, gear oils and other products requiring increased lubricity.

It was perhaps natural that petroleum producers should strive to improve their stability advantage and until very recent years the main effort of industry was to refine their oils and in so doing to remove all reactive elements. It remained for the exacting demands of the automotive industry to reveal the fallacy of this course and to disclose that some of these active materials contributed lubricating values.

Customarily, lubrication is explained on a purely mechanical basis. Thus it is assumed that, with bearing surfaces, minute projections interlock until they are floated apart on a film of lubricant. When this body of lubricant is sufficient to neutralize the interference of one surface with the other, a condition of "thick film" lubrication is said to exist. As loads are increased, the projections interfere and are knocked off, wear is increased, and we are dealing with thin film or boundary lubrication. Finally, the metals come in contact and we have seizure or galling.

Although this three stage theory is apparently supported by certain observations, and is quite convenient, it is doubtful that it will stand careful analysis. There is little doubt that, under ideal conditions, bearing surfaces are in fact separated by a hydrodynamic flow of lubricant. Admitting this, however, we are still far from an explanation of the peculiar relationships between bearing surfaces and lubricant which result in the establishment and maintenance of this flow or film.

Light vs. Heavy Oils

The film-forming quality of a lubricant is often connected with its viscosity and heavy oils are assumed to carry heavier loads because of thicker film formation. Testing machine tests, to date, have failed to substantiate this connection. Under the test conditions ordinarily used heavy oils carry no greater loads than light ones.

An unbalanced or polar molecular structure is frequently mentioned in explanation of lubricant behavior. Here, one end of a chain of string-like molecules is believed to be preferentially attracted to a surface. The surface thus becomes covered with a pile-like accumulation of molecules which are flexible and, like grass on a slope, conducive to slip.

It is certain that many substances which can be shown to be chemically active toward the bearing surface will, when added to neutral petroleum oils, increase their lubricity. From this, it is a reasonable conclusion that the material of the bearing surface itself is an important factor in the lubricating process and, in fact, that surface materials and lubricating compositions must be considered together.

Many investigators consider antiweld compounds and lubricity agents in the same bracket. We have treated them separately, however, as we believe the antiweld function can be definitely isolated and explained. To date there is only one real antiweld agent. It is sulphur. Sulphur and certain of its compounds definitely inhibit welding between metals in contact. It is quite generally believed that this is due to the rapidly formed sulphide film on metal surfaces. The fact that sulphur also tends to reduce wear presumably by the repetitious formation and rubbing away of the sulphide surface, would seem to support this belief.

Antiweld Properties Secondary

Except in the case of gear lubricants, and other applications where very heavy loads between like metals are encountered, it would seem that high antiweld properties are unnecessary. This quality should be balanced with lubricity characteristics to secure the best performance.

Stability is an important characteristic in a lubricant. When exposed to heat and the oxygen of the air, all oils tend to oxidize or polymerize and form secondary products which may be undesirable. This tendency increases rapidly as the temperature rises and few will stand temperatures above 225°F. without definite change. End products differ. Sometimes organic acids are formed. Frequently insoluble compounds are deposited in the form of gums, varnishes, or sludges. These end products may vary at different temperature levels, or, organic acids may combine with metal from the machine to form insoluble soaps.

Many so-called oxidation inhibitors may not, in fact, limit oxidation but rather produce a different, and [illegible] the application a less objectionable, end product. The wi[illegible] variety of gums, varnishes, and sludges resulting fro[illegible] the deterioration of lubricating oils will surprise anyone wi[illegible] has not given careful attention to the matter.

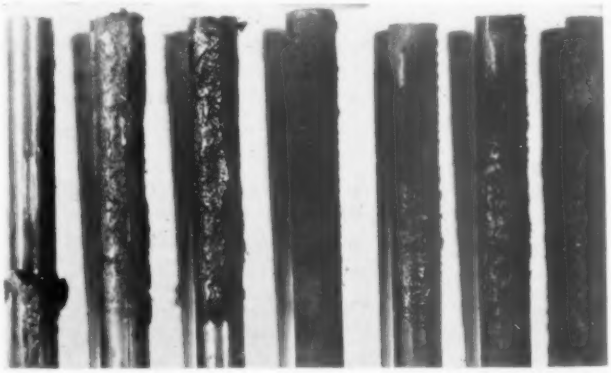
Certain bearing metals are highly susceptible to [illegible]ack by organic acids resulting from oxidation of lubricatin[illegible] oils. So-called corrosion inhibitors are therefore frequently r[illegible]ated to oxidation inhibitors. Thus, when silver, cadmium and high-lead copper bearings are used in automotive engi[illegible]s it has been found necessary to use certain types of antioxidants to limit bearing corrosion. Another type of so-called corrosion inhibitor consists of the lead soaps, organic phosphates, etc. sometimes used to prevent discoloration of metal[illegible] by active sulphur oils.

Oil viscosities vary greatly with temperature. An ordinary machine oil having a viscosity of 20 Saybolt seconds at 100°F. will run between 40 and 50 seconds at 210°F. This rate of viscosity change varies with oils from different sources. Oil refined from a coastal crude having a viscosity of 200 @ 100°F. will run 42 at 210°F., a midcontinent oil of the same viscosity at 100°F. will be 46 @ 210°F., while a Pennsylvania product will run 50 @ 210°F. For comparative purposes, a system of rating oils on a basis of a zero for typical coastal product and 100 for a high grade oil from Pennsylvania crude has been worked out. The value given an oil by this means is called its viscosity index. Certain complex organic compounds added to oils of low viscosity index will raise this value.

Factors for Tool Engineers to Consider

The changing viscosity characteristics of oils should receive more attention from machine designers. Pump capacities, rates of delivery through pipes and orifices, bearing temperatures and many other operating factors are involved.

It is unnecessary to more than mention pour point. Obviously, it is important only where low temperatures are encountered. From an industrial standpoint, it is usually comparatively easy to control temperatures so that low pour points are unnecessary. It is interesting to note, however, that one of the most serious, as well as the most interesting, problems of the airplane operator is to secure lubricants



Types of deposits resulting from oxidation or polymerization of oils.

which will function at the 65 below zero temperatures of the stratosphere, and still stay on the job a few minutes later when, on the ground, temperatures 200 degrees higher may be encountered.

Detergency is a quality in oil which has only recently been definitely recognized. Brought to attention by the discovery, in diesel engine operation, that some oils tended to deposit solids around piston rings and piston skirts while others carried the solids in suspension and thus prevented ring sticking and other difficulties, this property has assumed considerable importance in some fields. It merits attention.

Obviously, the material carried in suspension by high detergent oils can be removed from circulation by suitable filters, resulting in much cleaner and better operating conditions.

It would seem, then, that stringiness improvers are only desirable from a psychological standpoint, although many people believe that sticky stringy lubricants are superior because they apparently cling to bearing surfaces. There may be some operations where such characteristics are beneficial, but they are exceptional.

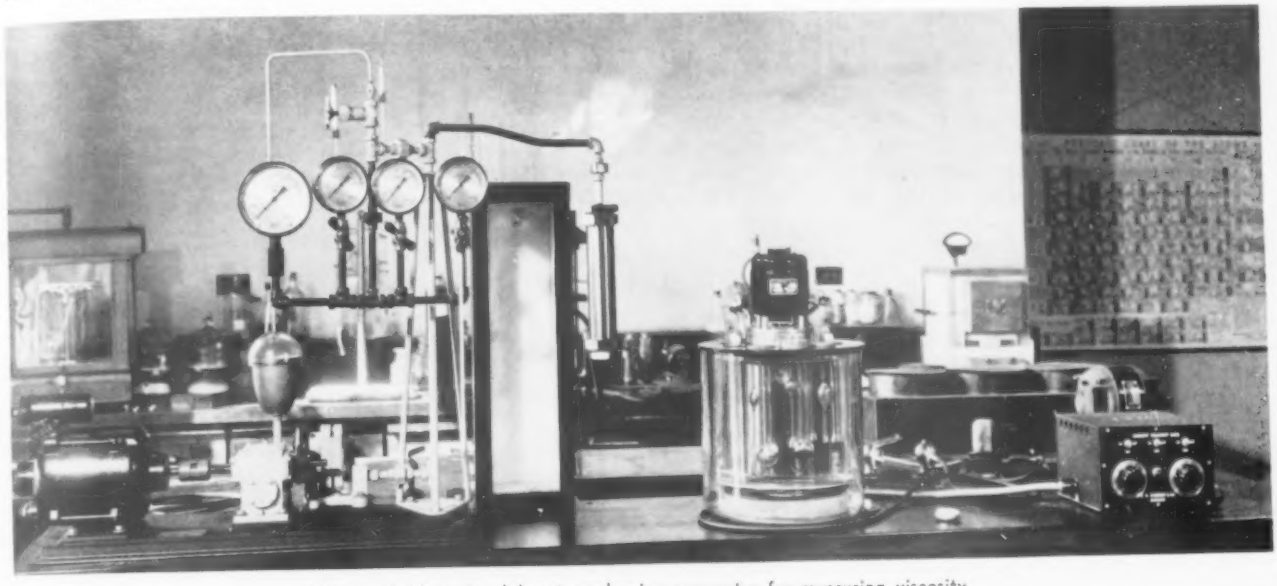
Foaming, in oils, gives trouble only where a great deal of agitation is present, but in these cases defoaming agents are sometimes a real help. The defoaming effect of certain of the much publicized silicones is remarkable—at least from a laboratory standpoint.

The principal barrier to better machine tool lubrication is a lack of knowledge—or at least of appreciation— of the fundamental qualities and limitations of lubricants and their relation to machine operation.

finely divided metal chips, gums from slushing compounds, and other objectionable materials with them. Where plate clutches operate in the lubricating oil, contamination with cutting oil will result in clutch slippage and possible damage.

Water emulsions may cause a great deal of difficulty if allowed to mix with the lubricating oil. This is not easily avoided, as water is heavier than oil and consequently tends to displace oil whenever it finds access to bearings or lubricating systems. Under some conditions the water separates in low parts of the system and accumulating water-soluble impurities give rise to corrosion and gum deposits. This is a frequent cause of complaint in hydraulic systems where gum deposits cause sticky valves and slides. Rather surprisingly, the best oils are likely to give the most trouble, as the water separates more completely due to high demulsibility.

During this war period a reverse situation has given a great deal of trouble. Dilution of cutting oil with lubricating oil has been so high, in many cases, that it has been difficult,



Corner of oil testing laboratory showing apparatus for measuring viscosity.

With a wide choice of construction materials available it is rarely that the machine designer gives thought to lubricants when he makes his choice. Thus, it has been customary to use copper tubing on screw machines where active sulphur cutting oils are in wide use, in spite of the fact that copper is extremely sensitive to sulphur. There is little reason why aluminum, brass or even steel tubing should not be used and thus eliminate certain irritating if not serious difficulties. Similarly some bearing materials are vulnerable to attack by active components or decomposition products likely to be encountered in lubricants. A little study and attention to this matter will save a lot of grief. Many operational troubles would be eliminated if the machine tool designer would think of lubricants while the blue prints are drying instead of waiting until the paint on the finished machine is dry.

Lubricant a Part of Machine

The lubricant is part of the design of a machine just as certainly as are the metals of its construction. Delivering the right lubricant, to the right place, at the right time and in the right amount to best do the job is no mean problem, particularly when temperature variations are taken into account. Too much lubricant is frequently as troublesome as too little. With ball and roller bearings especially, too much oil or grease will cause high temperatures and rapid deterioration.

The problem of preventing contamination of the lubricant is difficult, especially in machine tools where cutting fluids are used. While cutting oils will rarely, by themselves, give trouble if they get into the lubricating oil, they do carry

if not impossible, to keep the cutting oil up to standard. In some cases this difficulty has been alleviated by using a high quality cutting oil to lubricate the machine.

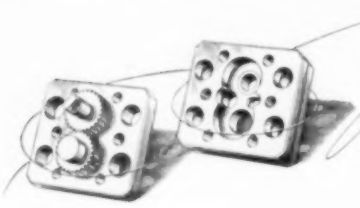
Improved lubrication should start with the machine designer. Recently, an executive of a large company manufacturing machine tools asked how he could better handle lubrication problems. He was somewhat chagrined when it was pointed out that he had a large number of engineers in his design department, most of them with university degrees, and several of scientific fame, while his lubricant problems were left to a comparatively untrained man from the shop.

Design and Operation Both Important

But we cannot blame everything on the designer. Machine operators, too, should know more about lubricants and lubrication. Trained personnel is essential, and there is no plant of any size where the assignment of at least one capable man to give his whole time to lubricating problems will fail to show a profit in increased production and efficiency. Most plants who have one oil man should have six.

For the machine tool builder and the large operator a laboratory is essential. However, don't equip a laboratory thinking that it will keep you from being gypped by high pressure oil men, although there is less danger that they will gyp you than that you will gyp yourself. And, don't figure that its purpose is to enable you to buy oils at a lower price. Plan, rather, that your efforts will enable you to use the best lubricants most effectively. Therein lies the greatest opportunity for profit.

By Arthur A. Nichols



Nylon and Two Stage

EIGHT years ago, Dupont engineers from The Buffalo Experiment Station came to W. H. Nichols & Sons, Waltham, with a pump problem. They had a definite idea as to what the pump should look like, and as to what materials had a possibility of meeting their requirements. At that time, however, the requirements were tentative and represented the best guesses of the chemical and mechanical engineers who had been assigned to the problem. The name used to describe the process, and the material which was to pass through the pump, made no particular impression at the time. The fluid was referred to simply as "the polymer." What "the polymer" looked like was hard to imagine because the Dupont engineers would not reveal its nature or its characteristics, except to say that it was "very hot and thick."

After considerable discussion and a few suggestions from Harold Lundstrom, our Chief Engineer, and Mr. W. H. Nichols, pilot models were agreed on. These consisted of very heavy steel discs, which were to be bolted into the bottom of the "polymer" tank and to the underside of which a Zenith metering pump of special material was to be attached. This was the start of the development which resulted in the present Zenith Nylon Pump as used in all Dupont plants and licensee plants. As with the other Zenith pumps, the Zenith Products Company, and particularly Mr. Fred McIntyre, kept in close touch with the development, but in this particular instance very little engineering consultant work was carried on with the Zenith Company, largely because the Dupont engineers assumed full responsibility for the design.

***Arthur A. Nichols*, partner in charge of engineering, W. H. Nichols & Sons, Waltham, Mass., is an alumnus of M. I. T., and is chairman of Boston Chapter, A.S.T.E. Since 1930, has been associated with the company founded by his father. He is inventor of machinery for making rotors.**

The function of W. H. Nichols and Sons was 10% pump design development and 90% manufacturing methods development.

Machining is Tough Problem

Almost at once the heavy steel disc feature was dropped because of the high material expense. The pump was reduced in size. Other features, such as the all-mechanical seal and means for removing the pump from its mount were added. But from the first, the hardest problem of all was machining and finishing the material. The shop men early referred to the pump—and still refer to it—as the "hot" pump, first because the pump was required to operate at temperatures which soften all but a very few of present day steels, and second, because any machining operation attempted on such material became a "hot" problem.

The experimental pump had shown that the first material selected gave fine results, so the task was simply up to the shop to find out how to produce the required accuracy in materials which resist all accepted types of machining operations. It is significant that the fundamental methods worked out for rayon pumps so far as finish grinding and lapping were concerned, worked out well on the new material. They worked out well because they were basically sound, but do not infer from this that they worked out easily. The very qualities that made the nylon pump outstanding in its job were the qualities which made the machining of the pump parts difficult, and so there was always satisfaction in knowing that the more trouble the shop had in working the parts, the greater the certainty that the pump was going to stand up to its destined job.

Design Affects Exactness

In tooling for a unit such as this, the average tool designer takes one look at the tolerance and immediately has visions of super-complicated mechanisms, special air conditioned laboratories, PhD's as machine operators and unheard of inspection equipment. It's true that fine things are produced under these conditions, but the story hasn't changed since tools were first used. Like the Phoenix, some of the finest work rises out of ashes. The exactness of the tools and machines is not in the paint job,—in the superficial qualities—but in the fundamental design.

Strength and Simplicity are probably the two most important factors in tooling for precision work. Strength, because a blow of the hand will jolt a two ton machine a tenth or two out of line. Simplicity, because the simple things are easy to make, easy to use and easy to maintain, but as a rule hard to conceive. Yet, once the basic idea is conceived, the design or working out of the construction is simple.

The tools and machines for the Nylon pump are basically those used on the Rayon pump. Some of these were designed about twenty years ago and are still operating, although they have been improved in detail.

Pump Design Basically Simple

The production problems were overcome, not by inventing new methods and developing them to a new point of refinement, but by taking known basic ideas and incorporating them into simple machines. The precision lapping is done on Norton Lappers. This machine was studied and the methods refined to the point where quarter-tenth tolerances in plate thicknesses and pin diameters are production tolerances.

The machines that were built were strong, simple machines. One is a special gear grinder to produce the ground gears—not one at a time, but ganged up—with a good production rate (Fig. 1). Another is a machine for grinding holes to size and position. Again, this machine is strong and simple. (Fig. 2) It was designed and built in thirty days! Fig. 3 shows a four station drilling jig made especially for doing the sideplate binder screw holes. This jig is shown not because extreme accuracy results from the design, but because a principle is involved, a principle common to all three of these machines.

Accuracy

An outline of problems solved in producing Rayon and Nylon pumps for operation at temperatures which would quickly soften armor plate.

Stated in simple words the principle is that of "two-stage accuracy." Most of us are quite used to single-stage accuracy such as we obtain from using jig borers, high grade milling machines, precision lathes, where the machine tool originates its own accuracy by means within itself—its lead screw, for example. The lead screw must be set either by dial or indicator for each operation, but a great range of flexibility results, with accuracy of a high order throughout the range.

"Two Stage Accuracy" is achieved when a basic machine is split into two so as to secure certain results. Usually accuracy is the most important result, and a high rate of production is a close second. The splitting process is well illustrated by the Fig. 2 machine. This machine is useless by itself; depending wholly on another machine in a far section of the shop to give it its heart of accuracy. The function of this second machine is to produce and check the accurate end measures used in the first machine. Thus, the machine of Fig. 2 becomes simple, plain, and supremely accurate because there is no flexibility requirement. This is two-stage accuracy.

Fig. 1. Gear grinder.

Fig. 2. Special hole grinder.

Fig. 3. 4 stage drill jig.

Fast, Accurate, Inexpensive

The Fig. 1 machine is fast, accurate, and inexpensive because of the simplicity and basic soundness of design. That combination is rare in a gear grinder, but may be obtained by the "two-stage accuracy" principle. In this case, the machine pictured is one of a battery, all backed up by a pair of secondary machines whose functions are first, to produce and maintain the tooth-spacing indexes; and second, to produce and maintain the wheel shaping mechanism.

The drill jig of Fig. 3 is backed up by the accuracy of the jig borer which produced the head and the jig bushing plate. This simple example is familiar to all toolmakers, and shows the germ from which "two stage accuracy" developed. The chief difference between the drill jig and the other two machines lies in the standard nature of the machine behind the drill jig as against the highly special machines behind the others.

Two-stage accuracy is a new field. As yet, there are no books or schools. The ideas are those handed down from the old guard to the young men. In this handing down the love and respect for simplicity has been emphasized, and rightly so, for the truly simple and fundamental is often hard to recognize.

Even after the experience of making several thousand of these pumps, there is always the drawing of a deep breath, a hitching up of pants, when a batch of nylon pumps are to be processed. It is understandable that a great deal of pride in accomplishment should be there, too, when the job is done and pumps are ready for shipment. Expressed in terms of numbers a single nylon pump is six times as difficult to make as a single stainless steel rayon pump, and this difference is not one of complexity, but simply of overcoming the stubbornness of the material which gives the nylon pump its character. Neither does this ratio express the difference in machining tolerances, for they are comparable to the tolerances of the rayon pump. Gears, for instance, are thicknessed to .00005; surface finish scratches average less than two micro inches (or millionths of an inch).

When the Dupont people put these pumps to work, they use a great deal of care to install them, but after that the real warfare begins, for the pump battles throughout its life submerged in molten "polymer" at a temperature which would soften armor plate in a few minutes. Not only must it stand this attack, but it must work and work hard producing output pressures ten times the pressure of the standard rayon pump. Out of this battle between pump, pressures, and heat comes this utterly beautiful and serene product—the nylon thread. Still it is a thread which carries some of the traits of the pump which made it—strength, accuracy, fine finish,

ANDYGRAMS

ORDINARILY, I PLUNGE right into a theme and, once in, wade right through. But, so many things have happened of late that I've been like the wanderer in the woods—too close to the trees to see the forest. However, I'm sure that you boys North, East, West, South—and your ladies—would like a review of the recent '45 Annual, so we'll devote the Column to that, leaving other matters for future consideration.

The Directors and officers began trickling in on Wednesday, the 21st, and by Thursday A.M. the Resolutions Committee was in full swing. This committee, which had its genesis at the Milwaukee meeting in '43—and which, incidentally, only functions during Directors meetings—is rendering an invaluable service to the Society.

As an old timer and past Director, I've sat in on many a meeting that, dragged out by voluminous reports and lengthy debate, lasted far into the small hours. By then, nerves would be frayed and tempers on edge, with the chance that, in sheer impatience to get through, matters of grave import would be compromised rather than settled on their merits.

Thanks to the Resolutions Committee, all that is past. Reams of committee reports and Chapter recommendations (many of them close duplications) are now reduced to clearly understandable paragraphs. Important items are emphasized, and recommendations made, thereby leaving time for matured consideration and such brief debate as may be necessary for orderly disposition.

This not only saves the Society considerable expense in the stenotyping of minutes and incidental typewriting, but cuts many hours from the meetings. The boys are through by dinner time, with the evening free for recreation and good fellowship, or—as the case may be—for important committee work. Without question, this Committee has greatly accelerated the progress of the Society.

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ON FRIDAY, the Directors convened, all present except Hank Goodfellow, Hallet Jones, Art Denis (who was scouting the Coast for designing talent) and Bob Douglas. Bob, incidentally, had threatened to bash my toes with a gun butt a/c I'd gotten into his hair over something or other, so I was all set with a pair of safety shoes. They're now for sale second hand, no points.

Of the National Committee chairmen, missed Ben Brosheer, Ed. Ernst and Irwin Holland, the latter detained in the East a/c a mediations Bd. meeting. Irwin has done such an outstanding job that, come another year, he'll probably find himself on the Executive Committee. But then, all of the committee heads may be commended on their work, however some may have labored under discouraging conditions—as, for example, Ed. Griffiths of Standards.

However, Ed. had a stout champion in Frank Walters, septuagenarian who came out of retirement to resume supervision of small tools at Westinghouse. The war will be over the sooner for the gumption and experience of the Old Timers. Here's to you, Frank!

Otto Winter, arch propagandist of *tool engineering* Education, has had his discouraging moments as well, but, perseverance levelling all barriers, is now in sight of his goal. Anyway, he came in for a big hand for his work, all of which bears out my contention that the man with the idea is the logical standard bearer. As for discouragement, the Vikings had an antidote: "When you can't hang on another minute, then, hang on another minute."

~ ~ ~ ~

IN THE ELECTION of officers, Clete Briner, Al Sargent and Brad Peirce stepped up one, two, three in orderly succession. Three good men! Tom Orchard, who was acting chairman of the Resolutions Committee, did such a good job that they elected him 3rd V.P.—an excellent choice. Likeable Al Schmit succeeded Earl Johnson as Secretary, while Jim Frederick, previously chairman of the Finance Committee, was the logical successor to Floyd Eaton as Treasurer. Johnson and Eaton had both expressed a wish to retire.

To my personal keen regret, Canada's Len Singer also chose to retire from the Executive Committee. Len, who is a born diplomat, has made himself very popular in the Society in addition to having proved himself an able executive. He'll probably go far, up in the Dominion. However, he was succeeded as Asst. Sec'y-Treas. by Bill Dawson of Hamilton, another Canadian who, like Bob Douglas of Montreal, has shown outstanding qualities of leadership.

~ ~ ~ ~

SATURDAY EVENING, the 24th, the boys were guests of Detroit Chapter, which had considerately postponed its March—Old Timers—meeting to coincide with the Annual. Around six o'clock, cocktails at the Wardell-Sheraton, then to the beautiful Rackham Foundation for dinner. There, with an attendance of several hundred, including ladies, the affair took on all the aspects of a National convention.

Dinner over, we convened in the Auditorium, where retiring Prex Doug Burnside installed the Detroit officers—Wayne Kay, W. B. McClellan, John W. Allmon, Guy L. Carpenter and Andrew Carnegie, these men having been elected Chairman, 1st and 2nd V.C., Secretary and Treasurer in the order named.

Past Prex Ray Morris then installed the National officers—C. V. Briner, President, A.M. Sargent, W. B. Peirce and Thos. Orchard 1st, 2nd and 3rd Vice President; Al Schmit, W. J. Fredrick and W. A. Dawson, all previously mentioned. Following well considered addresses by the retiring and incoming Presidents, the program concluded with a talk by Edgar Guest, popular Detroit poet whose verses have delighted a nation.

The ceremonies were impressive, and personally, I have nothing but the highest praise for Grant S. Wilcox, Jr., retiring Detroit Chapter Chairman, and his fellow officers for the masterly way in which the meeting was conducted. Grant has not only proven himself an excellent leader in the Society, but a shrewd industrial executive as well. We'll hear more of him as the years roll by, as, I daresay, we'll see a spurt of progress under the leadership of Prex Briner. And with that, *Au Revoir*.

Andy

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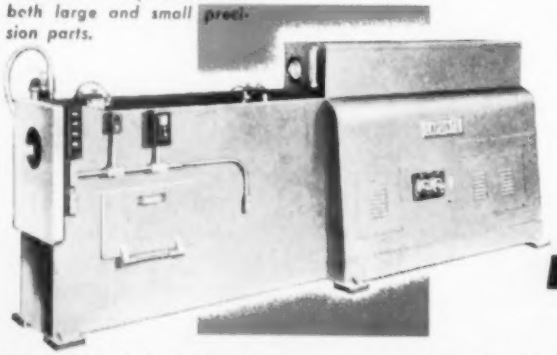

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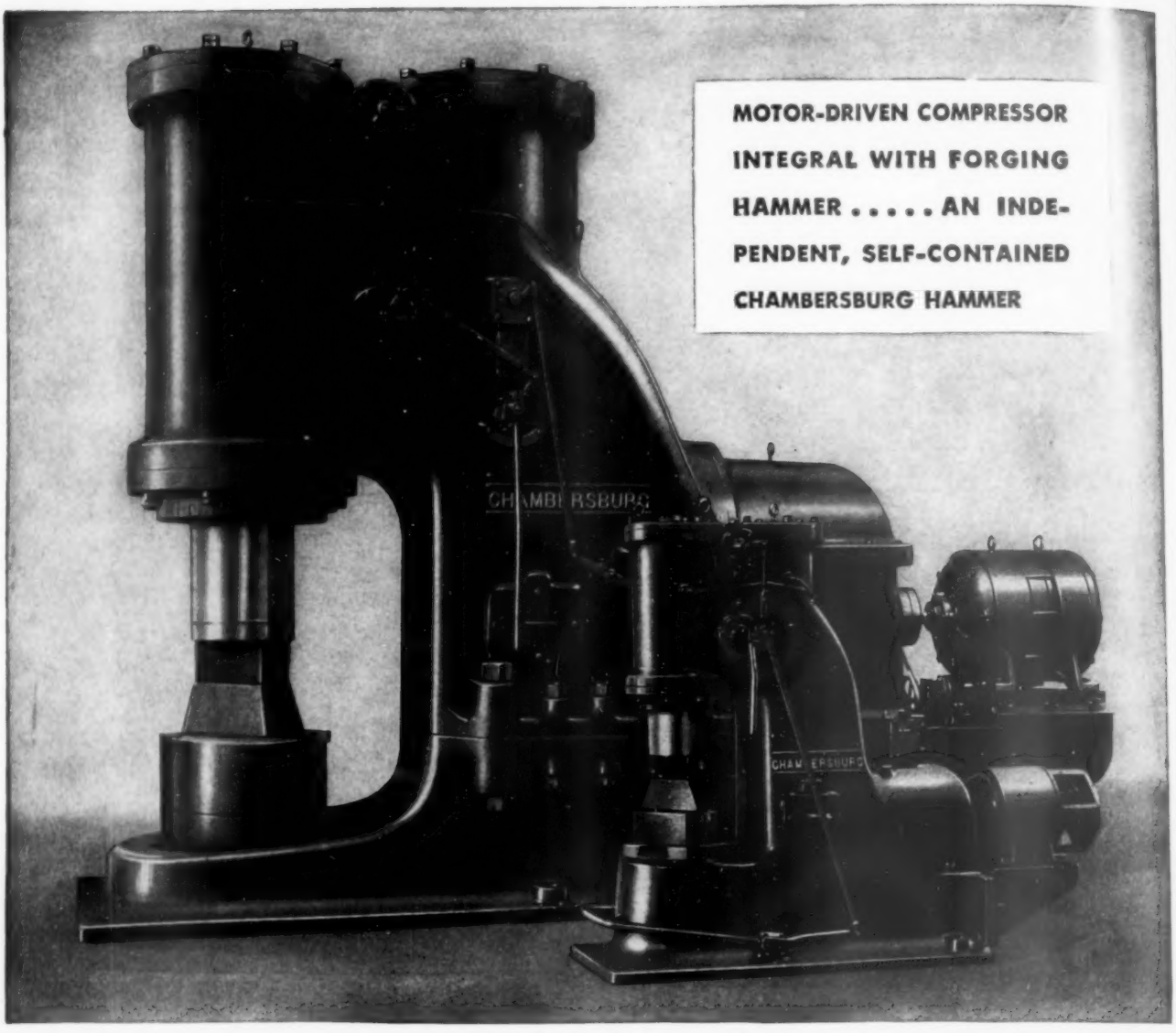

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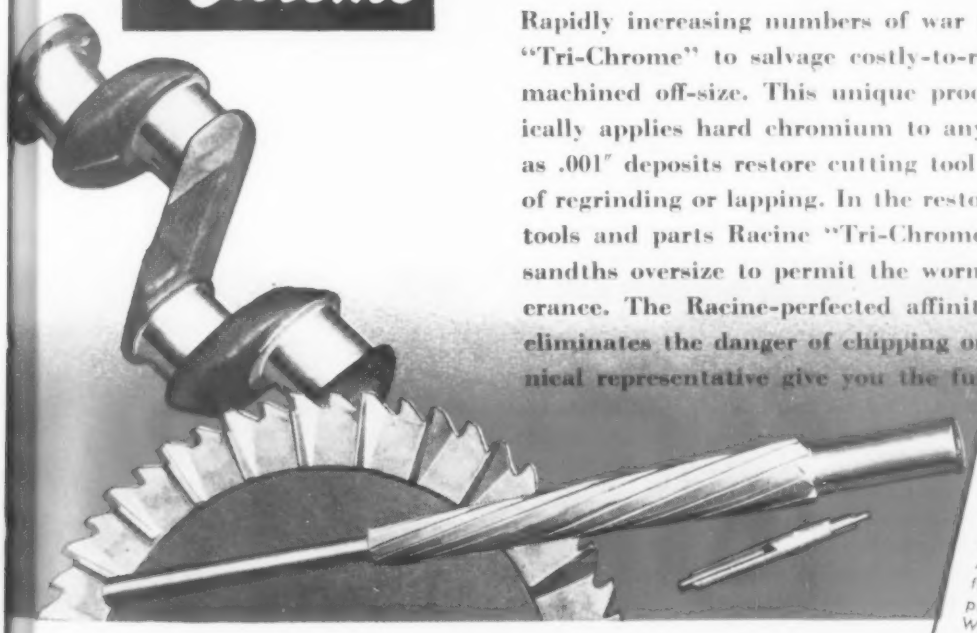

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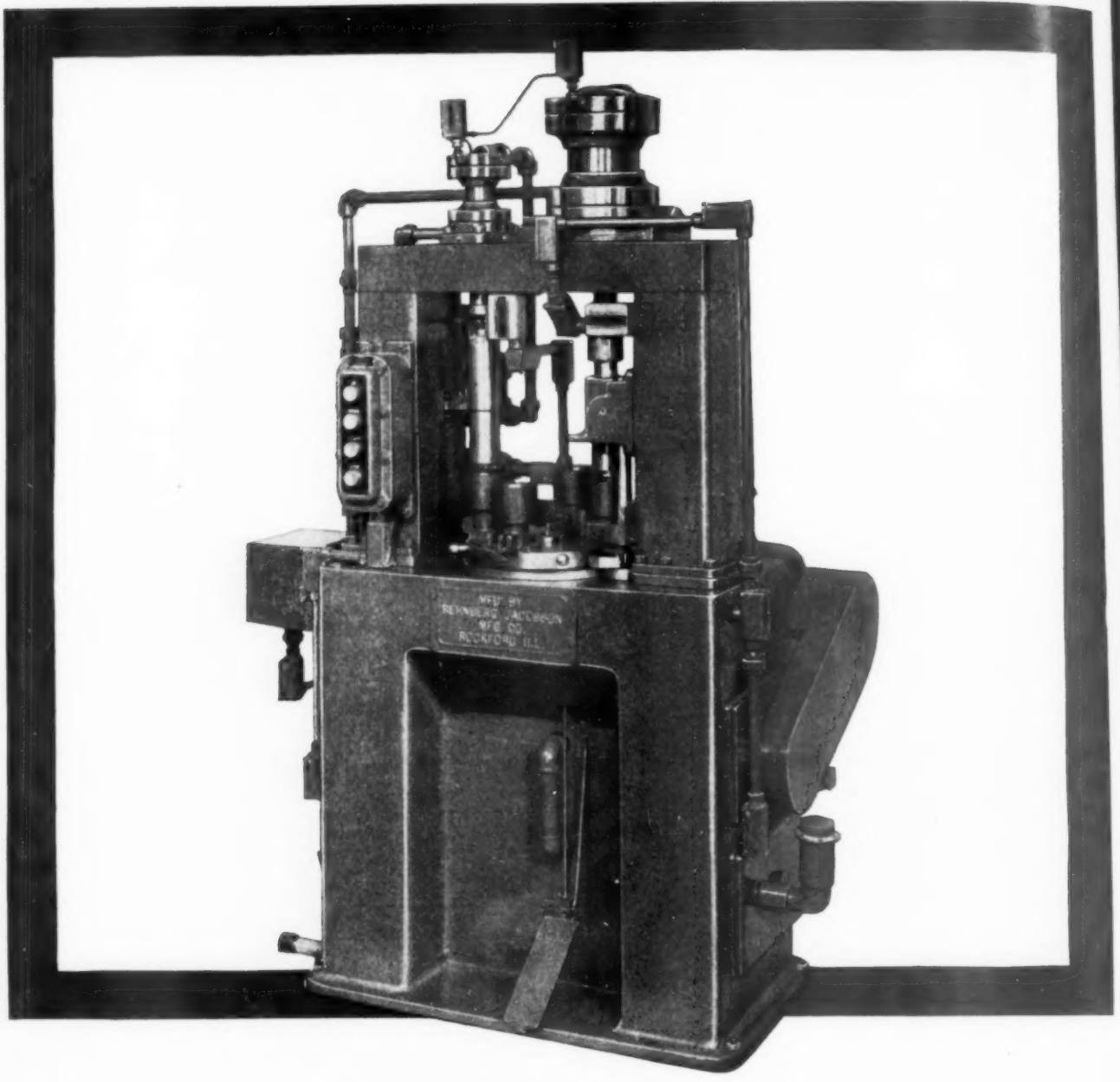

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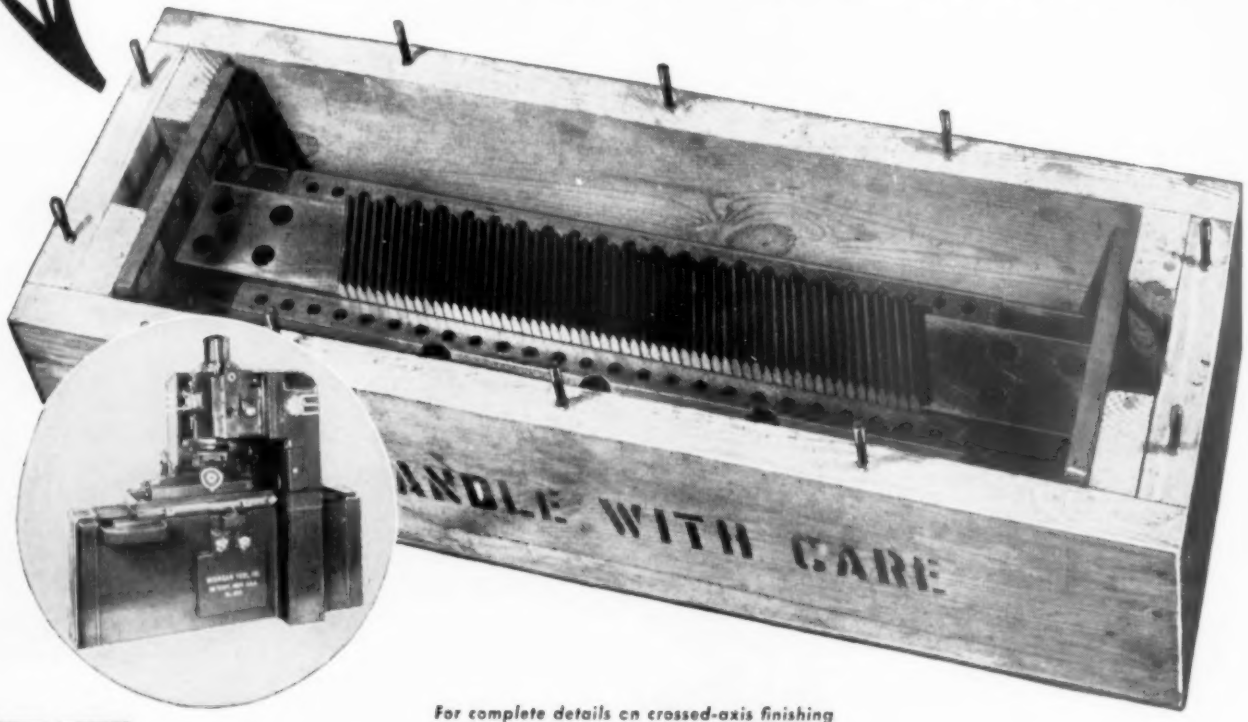

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First, *to produce cemented carbides that will exactly suit predetermined requirements of differing character.*

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Third, *to form the basis for continued research looking to still further improvement in the properties and applicability of Kennametal.*

● The invention and development of Kennametal—a scientific achievement—has led to corresponding useful arts. Kennametal's ability to cut hard metals with sustained accuracy, at greatly increased speed, has made major contribution to the technique of high production machining and milling. Its unique wear-resistant properties have created opportunity which many manufacturers have seized upon to give their products greater serviceability.

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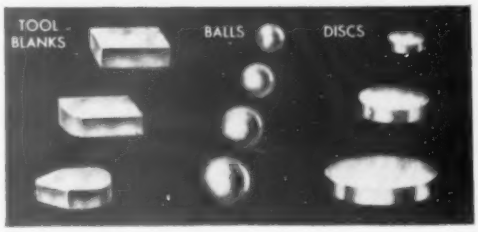

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• PLASTICS • LAMINATES

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The Inside Story of Zephyr in pictures sent on request.

Trimming a metal spinning in a plant where oil tank cars and truck bodies are made.

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Plywood Toys stacked 6 high. Each toy requires 2 minutes.

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A.S.T.E. NEWS

NEWS OF INTEREST AND ABOUT MEMBERS

WARTIME ANNUAL MEETING STREAMLINED

In sharp contrast to the usual heavy attendance at ASTE national meetings, the Thirteenth Annual Meeting, held at Hotel Fort Shelby, Detroit, March 23-24, had an official registration of 31 Directors and National Committee Chairmen, in compliance with the Office of War Mobilization order restricting such gatherings to a maximum of 50 persons. Several absentees were prevented from being present by activities of the War Labor Board in their respective localities.

D. D. Burnside
Retiring President

"I have enjoyed more than any other single phase of my business life my work with ASTE."

Highlighting the meeting was the annual election of National Officers. C. V. Briner, Manager, Gage and Tool Div., Pipe Machinery Co., Cleveland, won the continued confidence of the Society in his elevation to the Presidency, having served as Second and First Vice Presidents, and Chairman of the Organization Progress and Editorial Committees. A. M. Sargent, President and General Manager, Pioneer Engineering and Mfg. Co., Detroit, advanced to the First Vice Presidency, and W. B. Peirce, Vice-President, Research and Development, Flannery Bolt Co., Bridgeville, Penna., succeeded Mr. Sargent as Second Vice President. In addition to their previous National offices, Messrs. Sargent and Peirce have been serving on OPC.

Directors Elevated

Directors ascending to National Office included T. P. Orchard, Partner and General Manager, American Tool Engineering Co., New York City, who became Third Vice President; A. M. Schmit, General Manager, A. M. Schmit Co., Toledo, newly-elected National Secretary; and W. A. Dawson, Chief Master Mechanic, The DeHaviland Aircraft of Canada, Ltd., Toronto, elected Assistant Secretary-Treasurer. Former Director W. J. Frederick, President, Frederick Steel Co., Cincinnati, was elected Treasurer.

All of these men have extensive business and Society experience to guide them in their administration.

Considerable business was transacted in a relatively short time, largely through the efficient work of the Resolutions Committee, chairmanned by Thomas P. Orchard in the absence of I. F. Holland, in preparing business to come before the Board and in recommending action.

A net increase in membership of 16% was reported by National Membership Chairman V. H. Ericson who had record of 17,918 members as of February 28, 1945, including 1167 or 6½% of the entire roster serving in the Armed Forces.

Six new Chapters at Springfield, Ill.; St. Catharines, Ont.; Richmond, and Muncie, Ind.; Flint, and Pontiac, Mich.; have come into being since the 1944 Annual Meeting. A seventh, at Phoenix, Ariz., originally scheduled for chartering February 22, had its formal ceremonies April 26.

Chapter Activity Growing

Other communities evidencing considerable ASTE activity include Cedar Rapids and Waterloo, Iowa; Fox River

Newly-Elected Officers of A.S.T.E. 1945-46

Representative of the entire membership is this group of National Officers of A.S.T.E. for 1945-46, installed at the Rackham Building during the recent annual meeting at Detroit.

With an aggressive, forward-looking education and promotion program, as outlined elsewhere in this issue of *The Tool Engineer*, it is important that senior officers be promoted each year as they prove their ability. In this way the Society is assured a continuity of effort in carrying out its long-range program. In line with this policy the vice-presidents were "moved up" in the recent election of officers.

C. V. Briner
President
"You have given me an excellent slate. With your support, we'll try to give you a real business administration."

A. M. Sargent
First Vice Pres.
"I guess we need some work horses, too, so I'll do my best as a work horse."

W. B. Peirce
Second Vice Pres.
"It has been a pleasure to work with our officers. I assure them of my loyal support."

T. P. Orchard
Third Vice Pres.
"Thank you all very much. I'll do everything I can to warrant this honor."

A. M. Schmit
Secretary
"I am happy to accept in honor of my Chapter."

W. J. Frederick
Treasurer
"I appreciate the honor—I'll try to do a good job."

W. A. Dawson
Asst. Sec.-Treas.
"I only hope that I can approach the high standard established by my predecessor."

A•S•T•E *NEWS*

A Publication of the American Society of Tool Engineers

1666 Penobscot Bldg.
Detroit 26, Michigan

Editor, Adrian L. Potter
Associate Editor, Doris B. Pratt

Valley, Ill.; Burlington, Vt.; Vancouver, B. C.; and Evansville, Ind.

Fond du Lac Chapter, tied with Louisville in 1942 for possession of the Membership Trophy, emerged victorious from the 1944 contest, wresting the coveted cup from Twin States, the 1943 champs who lost out by only .034 points!

Profoundly impressed by the achievements listed in Education and Training Chairman Winter's report, the Board voted hearty approval and co-operation to the fullest degree possible in carrying out his recommendations, several Directors individually going on record to express their appreciation of his efforts. Culminating years of effort, a three-year, ASTE-approved curriculum in Tool Engineering is being offered in the fall catalog of Rochester Institute of Technology. Mr. Winter also stated that Ohio State University is about to conduct, jointly with ASTE, an industry survey of what a tool engineering course should offer, for submittal to its Board of Supervisors.

Recommendations proposed in the Committee's report included the earmarking of funds to complete tool design projects now sponsored by the U. S. Office of Education, tool engineering professorships and scholarships, the establishment of an apprentice program, and the shortening of the Committee's name to "National Education Committee."

Industry Relations Program

Industrial Relations Chairman B. C. Brosheer's report indicated considerable activity among the Chapters in maintaining closer relationship with local leaders of industry, the sponsorship of many Chapter "Executive's Nights," and the fostering of a more active interest on the part of the membership, in Chapter and Society activities.

An extensive increase in interest in ASTE on the part of industry, and a better understanding, by the public at large, of the functions and purposes of the Society was noted by Public Relations Chairman G. J. Hawkey and his Co-Chairman A. F. Denham in their joint report.

Both Committees were congratulated on their efforts sustained in the face of great difficulties.

Standards Chairman E. E. Griffiths made recommendations concerning the publication of standards articles in *The Tool Engineer*, the indexing of data sheets, and the initiation of standards, appealing for greater interest and co-operation on the part of the membership. All of these important matters will have the Board's consideration.

Encouraging progress on the projected "Tool Engineers' Handbook," under the editorship of Frank W. Wilson, was reviewed in the report of the Handbook Committee, submitted by Chairman E. W. Ernst.

Program Chairman L. J. Radermacher reported on the status of the current speaker survey being conducted through the Chapters for the purpose of securing information concerning the audience rating of such speakers, for subsequent distribution to Program Chairmen.

The activities of the Constitution and By-Laws Committee, Chairmanned by I. F. Holland, in processing the Constitutional changes recommended by the Organization Progress Committee under the leadership of C. V. Briner, and the current operations of the latter body in preparing a manual of instructions for the guidance of Society officials were considered simultaneously by the Board. Results of the Constitutional revision referendum to be submitted to the membership will determine the future work of OPC.

Appreciation was expressed to Executive Secretary Adrian L. Potter for his comprehensive report of the many phases of National Headquarters service.

Problems encountered and results achieved in the development and publication of *The Tool Engineer* were related in the report of Editorial Chairman C. V. Briner.

Realistic Financing Proposed

The newly-created Finance Committee, Chairmanned by W. J. Frederick, read its proposed budget based on anticipated income and disbursements, recommending that the accounting of such activities as the publishing of *The Tool Engineer*, the Handbook, exhibitions or shows be rendered as separate businesses.

Several items of new business were referred to the respective committees for consideration and action.

Time and Place Committee Chairman Ray H. Morris reported his Committee's recommendation that Houston's invitation for the 1946 Annual Meeting be accepted provisionally, subject to prevailing conditions. Houston Chapter Chairman H. R. Turner, present at the meeting, responded graciously: "We, of the Houston Chapter, feel honored that the Board has accepted our invitation to hold the next Annual Meeting in our city, war conditions permitting. We'll do our utmost to extend our Southern hospitality to all who attend."

Society's Growth Is Sound

In his farewell address to the Board, before recessing the meeting which reconvened the next evening for inauguration ceremonies, President Burnside asserted: ". . . I believe in the Society, and the significant thing is that I believe in it today much more strongly than I did when I first became active in its management functions. I have watched the Society develop. I have stumbled with it, and I know in my heart today that it is right, that it is sound, and that it will survive the inevitable mistakes it is going to make in the future, and I see in the far distance a monument to the vision and hopes of the organizers.

"I forget who it was who said, 'I regret that I have but one life to give for my country.' . . . My biggest regret is that there was not more time and energy to put into the work. . . . In my work this past year, I have had the best group of fellows that anyone could ask for—no former President had finer. . . . Have faith in your Society—it will contribute to a world order."

Accepting the invitation of Detroit Chapter to hold the installation of National Officers in conjunction with the local group's "Old Timers' Jubilee," the Board reconvened Saturday evening, March 24, at the beautiful Rackham Memorial Building, headquarters of the Engineering Society of Detroit.

Following a dinner in the Banquet Hall, honoring members of the original Board of Directors still affiliated with the Chapter, past and present National Officers from the Chapter, and former Chapter Officers, the gathering moved to the Main Auditorium of the building. There, President Burnside administered the oath of office to the Detroit Chapter officers-elect, Past President Ray H. Morris inducting the newly-elected National Officers.

Retiring President Honored

As his first official act, President Briner presented several war bonds, on behalf of the Board, to retiring President Burnside as an expression of their appreciation of his leadership, and the Society's Life Membership Certificate, authorized by the Board. An outline of prospective Society activities was included in the President's subsequent inaugural address.

The highlight of the evening was the presentation of Edgar A. Guest, Detroit's renowned poet, who delighted his audience, narrating in his own inimitable style incidents which inspired some of his well-loved verses.

Heating And Freezing

Washington, D. C.—Current fuel shortages made pertinent the lecture, "Heating and Air Conditioning—Present and Prospective," given by R. S. Dell, Bureau of Standards, at the Hotel 2400 meeting of Potomac Chapter March 1. Particular emphasis was placed on future heating systems, by Mr. Dell.

Elective officers installed included: Chairman, Lawrence Didszoneit, Quarterman Machinist; 1st Vice-Chairman, R. P. Thayer, Equipment Eng.; Secretary, D. T. Hilleary, Sr. Ord. Eng., Naval Torpedo Station, Alexandria, Va.; 2nd Vice-Chairman, H. M. Frazier, Metallurgist; Treasurer, R. T. Plitt, Supervisor, U. S. Naval Gun Factory.

Congratulations and good wishes are tendered Potomac Chapter Chairman Lawrence Didzoneit, along with the Chairman pin, by Director E. M. Seifert (right).

EDITOR'S NOTE:
Chapter news items originally intended for publication in the April TOOL ENGINEER are included in this issue. Additional April and May items will appear in the June issue.

Speakers at St. Louis Chapter's 6th Executives Night March 9. (Left to right) Industrial Relations Chairman Ernest Clarke, Dr. Hilton Ira Jones, guest speaker; Lt. J. G. Miller II of St. Louis Chapter, Past Chairman C. L. Miller, and Chairman R. F. Mueller.

Vibrations

St. Louis, Mo.—A program surpassing any previously scheduled was presented at the 6th Annual Executives Night held March 9 by Chapter 17 at Hotel DeSoto, and attended by 438 members and guests.

Industrial Relations Chairman Ernest Clarke gave an outstanding talk on "Tool Engineers of Yesterday, Today and Tomorrow," followed by Lt. J. G. Miller II, a Chapter member, who recounted some of his exciting experiences during missions over Berlin.

Principal speaker of the evening was Dr. Hilton Ira Jones, Managing Director, Hizone Laboratories, Wilmette, Ill., who delivered his well-known address on "Vibrations." His explanation and demonstration of electrical, auditory and heat vibrations makes these phenomena intelligible to the average person. Dr. Jones covered the whole range of vibrations from the simplest mechanical tapping through inaudible and audible sound waves, visible and invisible light waves, electrical, magnetic and, eventually, cosmic rays.

Bomber Plant Tour

Opportunity to visit the famous Ford Willow Run Bomber Plant was afforded those attending the Annual Meeting, on March 25, through arrangements made by Detroit Chapter. The Sunday afternoon private tour was personally conducted by William A. Simonds, who serves as official host at the plant, also having charge of research and writing.

Approximately three hours were required to inspect the factory and mile-long assembly line. The B-24s, composed of numerous major and sub-assemblies are constructed around the center wing, 4300 machines being used to build a bomber. Of particular interest to the ASTE'ers were the elaborate fixtures and the Ford-designed milling machine that performs a multitude of machining operations on the center wing while it is held in one position. On March 13 the 8000th Liberator rolled off the lines of this best-tooled of all aircraft plants which has turned out more 4-engine bombers at greater speed than any other.

Since the beginning of production, more than a thousand master changes, involving a million tooling hours and a half million engineering hours, and thousands of miscellaneous engineering changes, have been absorbed at the rate of 200 per day.

Production is now being cut back, with termination expected by August. Future plans are uncertain.

Pantographing

Chicago, Ill.—Approximately 200 members and guests of Chapter 5 were present at the meeting held in Huyler's Restaurant March 5. Included in the business of the evening was the installation of officers for 1945-46, retiring Chairman J. R. Miller administering the oaths and presenting the Chairman pin to Frank Armstrong who requested a rising vote of thanks to the outgoing administration for its excellent work.

Numerous alien patents on tools and gages, available from the Alien Property Custodian, were described by Mr. L. Sheldon, including a comment about the fine work done by the American Chemical Society in preparing for the Custodian an abstract of all chemical patents.

Elton Miottel, Eng., George Gorton Machine Co., Racine, screened an informative film, "An Exact Duplicate," introducing new developments and possibilities for using pantographing machines to simplify and solve daily engineering problems. An interesting discussion followed, Mr. Miottel answering many questions from the floor.

Milling

Columbus, Ohio—Installation of the 1945-46 officers for Chapter 36 was conducted by National Secretary E. V. Johnson at a dinner meeting in the Fort Hayes Hotel, March 14.

W. L. Kennicott, Chief Engineer, Kennametal, Inc., Latrobe, Pa., screened "Carbide Steel Milling," a new film illustrating face milling operations, half side milling, slotting, and so forth, with carbide tipped milling cutters. Mr. Kennicott augmented this presentation with an absorbing talk on cutter angles, displaying samples of the tools discussed and answering questions from a very appreciative audience.

Executives' Night

Boston, Mass.—Leading industrialists, representatives of government agencies and about 400 members of Chapter 33 heard Guy Hubbard, Machine Tool Editor, *Steel*, address the outstandingly successful First Executives Night held at Hotel Bradford, March 8.

Developing his subject, "The Human Side of Tool Engineering," (to be published in full in the next issue) Mr. Hubbard reviewed tool engineering from the sub-contracted, prefabricated building of Solomon's temple to Eli Whitney's development of mass production methods in the manufacture of government rifles.

Toastmaster Ralph E. Flanders, President of Jones & Lamson Machine Company and the Boston Federal Reserve Bank, related his observations, during pre-war visits abroad, of the introduction of mass production methods to the French airplane industry, by American Tool Engineers.

New England's contributions to the war effort and to the nation's prosperity were related by Dudley Harmon, Eexecutive Vice President of the New England Council.

Other speakers included Captain Spy, the Governor's representative; Captain Snyder, Shop Supt., Boston Navy Yard; Col. H. B. Sheets, District Chief, Boston Ordnance Dept.; and ASTE Past President Ray H. Morris who all lauded the Tool Engineer's achievements in making possible record breaking production with a minimum of skilled labor, through improved techniques. Vice President A. M. Sargent extended the greetings of the National Officers.

Die Heads

Minneapolis, Minn.—Otto Hoelzel of the Eastern Machine Screw Corp., New Haven, Conn., appeared before Twin Cities Chapter, February 14, at the Covered Wagon Cafe to discuss "Die Heads Used In Cutting Screw Threads."

In the limited time available, Mr. Hoelzel covered the ground thoroughly from generalized descriptions of various types of die heads to the more common troubles, and the problems found in gaging the finished threads.

Preceding the technical session candidates for office were submitted, the voting resulting as follows: Chairman, W. A. Ahlberg, Machine Shop Foreman, Brown & Bigelow, St. Paul; 1st Vice-Chairman, J. A. Harrington, President, Savage Tool Co., Savage; 2nd Vice-Chairman, C. V. Lofdahl, Tool Designer, Minneapolis Honeywell Reg. Co.; Secretary and Treasurer, W. H. Erskine, District Rep., Ex-Cello-O Corp.

New Officers of Springfield (Ill.) Chapter Installed at First Anniversary Meeting. (Left to right): L. T. Krause, Secretary; W. A. Napier, Treasurer; J. V. Javorsky, Chairman; H. H. Washbond, 1st V. Chairman; and H. C. Chambers, 2nd V. Chairman. Featured speaker at the March 6 meeting was H. M. Huffman, Field Eng., Cincinnati Milling Mach. Co., whose subject was "Cutter Sharpening Practice."

Broaching Problems

Cincinnati, Ohio—"Broaching Problems" was the subject presented by Albert Forberg, Practical Broach Eng., National Broach and Machine Co., Detroit, at the meeting held by Chapter 21 in the Engineering Society Headquarters Bldg., March 13.

Mr. Forberg traced the history of broaching from the first hand-operated broach or drift to the modern, efficient machine-operated broach of today, discussing internal, external, and specially shaped types. His practical approach to broach design was illustrated with a chalk talk, followed by questions from the floor.

Jig Boring

York, Pa.—The 12 members and 39 guests of Central Penna. Chapter, attending the meeting held at Pine Tree Inn February 13, enjoyed a splendid talk on "Jig Boring and Problems Connected Therewith," by F. O. Hoagland, Master Mechanic, Pratt & Whitney Div., Niles-Bement-Pond Co., W. Hartford, Conn.

Mr. Hoagland reviewed the history of measures and measuring devices, comparing them with present day methods and their relation to jig boring. The speaker was accorded an enthusiastic reception, and his return appearance will be eagerly awaited.

A resolution of respect was adopted and a moment of silent prayer observed in memory of E. B. Bowers whose death occurred February 1.

Electronics

Milwaukee, Wis.—Two speakers enlightened Chapter 4 on the currently-popular topic of electronics at their March 8 meeting in the Astor Hotel.

B. T. Anderson, Electrical Eng., Sundstrand Mach. Tool Co., Rockford, Ill., explained "Electronics as Applied to Machine Tools," showing in slides and films actual applications.

The construction and functions of various types of electric tubes were described by R. E. Welton, Electronics Eng., G. E. Co., in his talk, "Electronic Tubes."

Following a technical discussion from the floor, installation ceremonies were conducted for the recently-elected Chapter officers.

Negative Rake Milling

Hartford, Conn.—Further proof that negative rake milling is considered the most revolutionary development in shop practice since the advent of tungsten carbide was evidenced in the address C. O. Herb, Managing Editor, *Machinery*, delivered to Chapter 7 on March 5. In his paper, Mr. Herb reported many successful applications in various shops throughout the country, using slides for illustration.

The oath of office was administered to incoming Chapter officers by H. A. Rockwell, retiring Chairman, before an audience of 280 at the Hartford Gas Co. Auditorium meeting which followed the dinner served to 135 at the City Club.

Mr. H. Young, a member of the Foremen's Club at Royal Typewriter Co., also spoke interestingly on the founding, purpose, and factors entering into the continued success of the club.

Installation

Fond du Lac, Wis.—The 1945-46 leaders of Chapter 45 were inducted into office during a meeting held at Hotel Athearn, Oshkosh, March 9, attended by 86 members and guests.

Those installed are: Chairman, Gideon Kane, Production Eng., Northwest Engineering Corp., Green Bay; 1st Vice-Chairman, George West, Production Eng., Kaukauna Mach. Corp., Kaukauna; 2nd Vice-Chairman, L. J. Kaufman, President, L. J. Kaufman Mfg. Co., Manitowoc; Secretary, E. J. Kaiser, Chief Draftsman, Giddings & Lewis Mach. Tool; Treasurer, J. P. Schommer, Tool Purchasing & Supervision, Wisconsin Axle Div., Oshkosh.

"Quality In The Making," a film describing the manufacture of ball bearings, was shown by Messrs. R. J. Lynch and H. G. Wilson of New Departure Tool Co., Chicago, introducing their discussion on the application of ball bearings to machine tool spindles and various drives.

* * *

Hotel Conway, Appleton, was the meeting place February 9 when 77 members gathered to elect officers and to hear J. W. Kinsey, Field Eng., Micromatic Hone Corp., Detroit, discuss "The Hone Abrading Process," illustrated with films and samples of honed parts.

Milwaukee Chapter's giant gavel changes hands as Chairman A. R. Gieringer (left) receives it from retiring Chairman F. C. Koehn (extreme right), with Secretary R. H. Ford, 1st V. Chairman R. M. Nauertz, 2nd V. Chairman J. B. Jilbert, and Treasurer Joseph Ebner (left to right) looking on.

H. G. Libby (right), Past Chairman Worcester Chapter, bestows Chairman pin on F. W. McQueston, 1945 Chairman.

Magnetic Chucks

Worcester, Mass.—The more than 100 members and guests who attended the March 6 meeting of Chapter 25 at Putnam and Thurston's heard an excellent technical talk by one of their own members, J. J. Ladden, Gen. Mgr., O. S. Walker Co., Inc., who discussed "Magnetic Chucks For Post-War Production."

Installation of the recently-elected officers was conducted by Director W. W. Young of Boston.

Completing the program, a color-sound film on "Turret Lathes—Their Operation and Use," was presented through the courtesy of Gisholt Machine Co.

Duplicating

San Francisco, Calif.—Eighty members and guests of Golden Gate Chapter assembled at the Engineers Club for dinner February 13, with attendance at the annual election and technical session increasing to 110.

Chosen to lead the group for the coming year are: Chairman L. A. Talamini, Tool Eng., Friden Calculating Machine Co., San Leandro; 1st Vice Chairman, E. J. Raves, Chief Inspector, Grove Regulator Co., Oakland; 2nd Vice Chairman, W. W. Gustafson, Screw Machine Eng., Marchant Calculating Mach. Co., Oakland; Secretary, E. C. Holden, Tool Eng., U. S. Naval Air Station; Treasurer, H. H. Hagedorn, Abrasive Eng., Pacific Abrasive Supply Co.

Program Chairman Fred Kruse presented the guest speaker, Elton Miottel, Eng., George Gorton Machine Co., Racine, who gave an excellent talk on "Tracer Controlled Duplication," supplemented with an interesting color-sound film.

Heating Processes

Hamilton, Ont.—The wonders and varied applications of "Induction and Di-Electric Heating" were very ably explained to members of Chapter 42 by J. W. Cable, Director of Research and Development, Induction Heating Corp., New York, at the dinner meeting held March 9 at Royal Connaught Hotel.

Keen interest was evidenced by the fact that many of the audience of 104 remained after the meeting to discuss the subject further with Mr. Cable whose talk was illustrated with blackboard drawings and slides.

The 1945-46 officers were sworn in by Past Chairman C. A. Fisher.

Retiring Los Angeles Chairman Dick Linch (right) turns over Chairmanship, gavel, and responsibilities to Arthur Lewis '45-'46 Chairman.

Sub-Zero Chilling

Los Angeles, Cal.—"Cold Treating Practice, With Deepfreeze Industrial Sub-Zero Chilling Equipment," a double-header technical session, attracted 262 members and visitors of Chapter 27 to the March 8 dinner meeting at Scully's Cafe.

Fred Whitcomb, Deepfreeze Industrial Div., Motor Products Corp., Chicago, told of the sub-zero tool and metal treatment for increasing the life of high speed cutting tools, blanking and forming dies, stabilizing of gages, lapping flats and machines, in various plants throughout the country.

Local applications of the Deepfreeze processes were reviewed by Metallurgist F. L. Dean of Green-Penny Co.

Honing Functions

Elmira, N. Y.—Future applications as well as the history and present developments in "The Hone Abrading Process" were included in the address given by J. W. Kinsey, Field Eng., Micromatic Hone Corp., Detroit, before the 90 members and guests of Chapter 24, who met at Mark Twain Hotel, March 5.

Two film productions sponsored by Micromatic, told the story of the three-way developments of honing—to correct errors from previous operations, to provide a close fit and mirror finish to limits of about .0002", and to remove large amounts of stock quickly. The latter function is based upon an analogy between common single-edged cutting tools and the abrasive wheels and sticks which may be regarded as multi-cutters. Highly instructive, the session greatly exceeded all expectations.

The oath of office was administered to 2nd Vice-Chairman Edward Stachel, all other officers being retained for a second term.

Induction Heating

Providence, R. I.—Director Frank W. Curtis gave one of his splendid talks on Induction Heating at a meeting of Little Rhody Chapter, Feb. 21.

Mr. Curtis, Consulting Engineer, Induction Heating Corp., New York, illustrated with slides his discussion covering the use of high frequency current for hardening, brazing, and other processes, on a production basis.

The dinner meeting, held at Oates Tavern, was attended by 65 members and guests.

Plastics In Vehicles

South Bend, Ind.—Uses of Plastics in Post-War Automotive Vehicles," a topic of current speculation, were outlined by C. A. Scogland, Plastics Eng., Studebaker Corp., technical speaker at a meeting of Chapter 30 held February 13 at the Indiana Club. Mr. Scogland traced the history of plastics from the discovery of celluloid to the development of present day materials, pointing out that the problem in plastics engineering is to select the right material for the job. He estimated that a well-engineered, all-plastic car would sell for about $4000, but that such a product would not be available in the near future. His display of plastic articles created much interest among the audience.

The business session was devoted to the election of officers for 1945-46. Tabulation of ballots resulted as follows: Chairman, P. W. Winkelmann, Owner, The Winklemann Co.; 1st ViceChairman, O. H. Schafer, Owner, Schafer Gear Works; 2nd Vice-Chairman, C. C. Stevason, Instructor, Notre Dame University, Notre Dame; Secretary, J. L. Kemp, Mach. Des. Leader & Est., Sibley Mach. & Foundry Corp.; Treasurer, Stanley Bojarski, Foreman, Gage Inspection, Studebaker Corp., Aviation Div.

Honing and Turbines

Grand Rapids, Mich.—Western Michigan Chapter, at a meeting held February 12 in the Park Congregational Church, conducted their annual election of officers.

Balloting brought the Chairmanship to T. E. Newby, Sales Eng., F. Raniville Co. Others elected included: 1st Vice-Chairman, J. B. Brierly, Sales Eng., Joseph Monahan Co.; 2nd Vice-Chairman, M. A. Pearson, Partner, Pearson-Buttrick, Inc.; Secretary, H. W. Young, Master Mechanic, National Brass Co.; Treasurer, E. E. Cederquist, Tool Eng., American Seating Co.

Following the screening of the Allis-Chalmers film, "Tornado In a Box," showing the development of the gas turbine, J. W. Kinsey, Field Eng., Micromatic Hone Corp., Detroit, spoke on "Honing," augmenting his remarks with a sound film and samples of work.

New Methods

Rockford, Ill.—A. A. Schwartz, Chief Tool Research Eng., Bell Aircraft Corp., Buffalo, gave the members of Chapter 12 an insight into "New Production Methods" at their March 1 meeting.

In his paper Mr. Schwartz emphasized the advantages of induction heating, new metals and their uses, and hot forming as a means of making materials more plastic and workable to reduce machining operations.

The 130 members present at the closed meeting voted into office for the ensuing year: Chairman, W. R. Lustig, Tool Eng., Atwood Vacuum Mach. Co.; 1st Vice-Chairman, D. E. Hawkinson, Asst. Chief Eng., Greenlee Bros. & Co.; 2nd Vice-Chairman, R. Y. Seborg, Elec. & Hydr. Eng., Barnes Drill Co.; 3rd Vice-Chairman, Joel Jannenga, Design Eng., Ingersoll Milling Mach. Co.; Secretary, E. A. Norrman, Test Eng., Woodward Governor Co.; Treasurer, H. A. Nelson, Sales Eng., Barber-Colman Co.

Press Brake Tooling

Toronto, Ont.—At one of the largest meetings of the year, held February 12 at Malloney's Art Gallery with over 125 people present, Chapter 26 conducted an election of officers and a very successful technical session.

Chosen to head up the Chapter for the '45-'46 season are: Chairman, R. E. Crawford, Editor, *Canadian Mach. & Mfg. News;* 1st Vice-Chairman, W. W. Appleton, Canadian Mgr., Brown & Sharpe Mfg. Co.; 2nd Vice-Chairman, L. M. Jardine, Supt., Coleman Lamp & Stove Co., Ltd.; Secretary, J. B. Burk, Sales Eng., Railway & Power Eng'g. Co., Ltd.; Treasurer, H. C. Upton, Mgr., Machine Tool Div., Canadian Fairbanks-Morse Co., Ltd.

Messrs. A. G. Baumgartner and Edward Peters of the sales and die engineering departments, respectively, Cincinnati Shaper Co., Cincinnati, Ohio, presented "Dies and Tooling for Press Brakes," implementing their discussion with a series of slides showing the vast range of work possible with the modern press brake and shears. Tooling, in relation to the versatility of machines, was emphasized throughout.

Toronto Chapter Executives. (Left to right, seated): W. W. Appleton, 1st V. Chairman; J. B. McRae, Immediate Past Chairman; R. E. Crawford, Chairman; J. B. Burk, Secretary. (Standing): L. M. Jardine, 2nd V. Chairman; H. C. Upton, Treasurer; H. L. Flynn, Editorial and Public Relations Chairman; T. H. C. Alison, Membership Chairman.

Triple Film Feature

Dayton, Ohio—A dinner meeting at the Engineers Club, March 12, attended by about 45 members of Chapter 18, featured a triple motion picture program instead of the customary technical speaker.

The first film, "B-29's Over Dixie," depicted the building of the huge Bell Aircraft plant in Georgia, its personnel and production problems. "New Horizons in Welding," showed modern welding techniques employed by the Harnischfeger Corp. The program concluded with the Bryant Chucking Grinder production, "Tooling For Better Internal Grinding," giving an insight into internal grinding and the variety of chucking problems encountered in the tool room and in production.

Powdered Metal Parts

Racine, Wis.—Incredible phases of the now advanced art of fabricating from powdered metals, including quick tool-up, saving of man hours and the conservation of strategic materials were disclosed by G. E. Platzer, Chief Engineer, Amplex Div., Chrysler Corp., Detroit, speaking March 5 at a meeting held by Chapter 2 in the Manufacturers Association headquarters.

Five major steps involved in producing parts from metal powders were outlined in detail in a description of the making of Oilite bronze bearings. The versatility of features obtainable with this new process, which will assist designing, production and maintenance engineers in the creation of finer products, made a most favorable impression on the 110 members and guests.

Material Handling

Windsor, Ont.—Principal business on the agenda of the February 12 meeting of Chapter 55, held at the Prince Edward Hotel, was the electing of new officers to direct the Chapter during the coming year. Counting of the ballots revealed that the membership had chosen as Chairman, C. G. Sampson, Mach. Shop Supt.; 2nd Vice-Chairman, Reginald Richards, Div. Supt., Ford Motor Co.; 1st Vice-Chairman, W. B. Moore, Plant Eng.; Treasurer, A. E. Carley, Asst. Plant Eng., Chrysler Corp.; Secretary, P. O. Harrison, Mgr., Canadian Fairbanks-Morse Co.

Speaker of the evening, Ezra M. Clark of Clark Equipment Co., Battle Creek, Mich. gave a talk on material handling methods, supported by two films.

Broaching Development

Portland, Me.—Chapter 46 met at the Lafayette Hotel February 16 to elect officers and to hear A. A. Cambria, Chief Design Eng., and Kenneth Macomber, Ass't. Design Eng., LaPointe Mach. Tool Co., Hudson, Mass., present "The Development of Broaching," an informative discussion illustrated with a film.

New officers elected to head the Chapter for the coming year are: Chairman, J. M. Johnston, Master Mechanic, Oxford Paper Co., Maine Coated Div., Rumford; 1st Vice-Chairman, H. D. Andrews, Owner, Twin City Machine Co., Auburn; 2nd Vice-Chairman, M. C. Corson, Chief Eng., Maine Steel, Inc.; Secretary, C. E. Paige, Mgr., Industrial Div., Edwards & Walker Co.; Treasurer, F. E. Thomes, Pres., Thomes Mfg. Co.

Hydraulics

Richmond, Ind.—Chapter 66 made its usual good turnout March 13, with 107 attending the Leland Hotel Dinner meeting.

H. K. Herman, Vice-Pres. and Gen. Mgr., Vickers, Inc., Detroit, read a technical paper on "New Developments in the Hydraulic Transmission of Power," at the conclusion of which he traced with slides the history and development of hydraulics from earliest times to their current applications, particularly in war production. Inspection of the many cutaway models of hydraulic valves and motors which he displayed held the attention of the group for some time after the close of the meeting.

Ceremonies, marking the installation of new officers, preceded the technical session.

"Congratulations on a swell job, Cliff," Incoming Chairman Barnett (right) extends Atlanta Chapter's appreciation to Retiring Chairman Brownell, with the presentation of a Past Chairman pin.

High Speed Milling

Atlanta, Ga.—Principal speaker at the inaugural meeting held by Chapter 61, March 7, at the Ansley Hotel was Dr. H. A. Frommelt, Chief Research Eng., McKenna Metals Co., Latrobe, Pa., who presented interesting new aspects of "High Speed Milling." Following his talk and the accompanying slide films, Dr. Frommelt conducted an open forum, answering questions from the floor.

Retiring Chairman Clifford Brownell, who installed the new officers, received a Past Chairman pin from the incoming Chapter Chairman, S. W. Barnett, on behalf of the Chapter.

Electronics At Work

Williamsport, Pa.—J. H. Shafer, Chief Tool Eng., Darling Valve & Mfg. Co., was elected to head Chapter 49 at the meeting held February 12 in Odd Fellows Hall. Other 1945 offices went to Gordon Stout, Tool Designer, American Car & Foundry Co., 1st Vice-Chairman; Stanley Barendt, Service Eng., Aviation Corp., Secretary; Frank Nonemaker, Jr., Chief Draftsman, Milton Mfg. Co., Milton, Treasurer.

The 99 members and guests who attended the meeting felt better informed concerning the new science of electronics after hearing Louis Gise, Electronics Eng., Westinghouse Electric & Mfg. Co., Philadelphia, explain the operation of radio tubes, their application to the processes of resistance welding, induction heating, dialectric heating, photoelectric cells in the operation of counting devices, operation of D. C. motors, and safety application on machine tools.

Planetary Milling

Pittsburgh, Pa.—The March meeting of Chapter 8 was held on the 2nd at Fort Pitt Hotel, with an attendance of 137.

Third Vice-President W. B. Pierce inducted into office Chairman C. E. J. Brickman, Mfg. Eng.; Secretary W. S. Risser, Purchasing Agent, Westinghouse Elec. & Mfg. Co., E. Pittsburgh; 1st Vice-Chairman W. H. Schott, Sales Eng., Barney Machinery Co.; 2nd Vice-Chairman A. S. Harris, Tool Eng., Pittsburgh Forgings Co., Coraopolis; Treasurer W. D. Shields, Eng., Voss Machinery Co.

L. L. Lee, Vice-Pres., Plan-O-Mill Corp., Detroit, well qualified as an authority, spoke on "Planetary Milling." Construction of the machine and methods of setup were shown and thoroughly explained by Mr. Lee who used slides to demonstrate some of the difficult jobs now being done.

* * *

"Material Handling In The Navy," was the subject presented by Lt. R. J. McGreevy, Navy Bureau of Supplies and Accounts, at the February 2 meeting.

After a short introductory talk, Lt. McGreevy screened films showing the tremendous operations required to move materials under actual battle conditions.

Exact Duplicates

Portland, Ore.—About 75 members and friends of Chapter 63 turned out for the annual election held February 15 at the Mallory Hotel.

The one-year-old group chose as 1945-46 leaders: Chairman, R. E. Neils, Works Mgr., Schmitt Steel Co.; 1st Vice-Chairman, R. L. Smith, Tool Eng.; Treasurer, W. E. Brennan, Supervisor, General Eng. Dept., Iron Fireman Mfg. Co.; 2nd Vice-Chairman, G. E. Healy, Ind. Gas Eng., Portland Gas & Coke Co.; Secretary, J. R. Barrett, Instrument Dept. Supt., Moore Dry Kiln Co.

Christ Jute, Pres., American Electric Furnace Co., Boston, narrated his interesting experiences in engineering installations of large production heat-treated furnaces in various countries throughout the world.

Technical speaker Elton Miottel of the George Gorton Mach. Co., Racine, Wis., showed "An Exact Duplicate," an admirable film illustrating his remarks on new applications of pantographing.

Cold Treating Metals

Springfield, Mass.—"Low Temperature Equipment and Cold Treatment of Metals," a subject of interest to all Tool Engineers, was discussed by Fred Whitcomb, Deepfreeze Div., Motor Products Corp., Chicago, at a meeting of Chapter 32 held February 12 at Highland Hotel.

Voting for new officers resulted in the election of: Chairman, E. J. Stone, Mfg. Eng., Westinghouse Elec. & Mfg. Co.; 1st Vice-Chairman, C. H. Stonerod, Field Service Eng., E. F. Houghton & Co.; 2nd Vice-Chairman, A. W. Todd, Chief Eng., Van Norman Co.; Secretary, O. C. Stevens, Field Service Eng., Stedfast & Roulston, Inc.; Treasurer, W. T. Ingham, Chief Tool Des., National Blank Book Co.

An added feature enjoyed by the approximately 150 members and guests present was the screening of a new film, "The Sikorsky Helicopter."

Broaching Questions

Springfield, Vt.—Approximately 100 members and guests of Chapter 40 met at the Community House February 14 for the annual election of officers and a technical session devoted to Broaching.

Qualified voters present elected to office: Chairman, G. R. Morin, Chief Sales Engineer, Jones and Lamson Mach. Co.; 1st Vice-Chairman, W. E. Farrell, Purchasing Agent, Cone Automatic Mach. Co., Windsor; 2nd Vice-Chairman, A. E. Stubbs, Foreign Sales Mgr., Bryant Chucking Grinder Co.; Secretary, W. C. Hadfield, Engineer Supervisor, Fellows Gear Shaper Co.; Treasurer, P. R. Lovejoy, President, Lovejoy Tool Co.

A. A. Cambria, Chief Design Eng., La-Pointe Mach. Tool Co., Hudson, Mass., explained the "Why, What and How of Broaching," illustrating in slides recent developments in broaching machines. Particularly impressive were the fully automatic and multiple station machines used in the production of propeller hubs, breach blocks and gun barrels.

Steel Treatment

Wichita, Kans.—A dinner and social hour at Droll's English Grill preceded the annual election meeting of Chapter 52 held February 13.

Choosing from the candidates submitted by the Nominating Committee, the members elected: Chairman, Harry Giwosky, Gen. Foreman, Tool Planning; 2nd Vice-Chairman, Harold Bales, Foreman, Tool Design, Boeing Airplane Co.; 1st Vice-Chairman, Roy Osborn, Tool Designer, Cessna Aircraft Co.; Secretary, L. R. Glassburner, Tool Inspector, Beech Aircraft Corp.; Treasurer, Rex Moore, Chief Tool Designer, Aero Parts Mfg. Co.

Second Vice-Chairman Harold Bales served as technical speaker, detailing "Heat and Cold Treatment of High Speed Tool Steels."

Precision Accuracy

Fort Wayne, Ind.—Use of a mobile inspection unit for checking tools, gages and the proper gaging of production work to millionths' of an inch accuracy was demonstrated in a film presented by C. C. Fuller, R. J. Potter, and R. N. Nightingale, Field Engineers for the Doall Central Co., Indianapolis, at a meeting of Chapter 56 held in the Chamber of Commerce Bldg., March 14. Their accompanying presentation, "Scientific, Precision Accuracy," was enthusiastically received by the audience of about 85.

Retiring Treasurer G. D. White conducted the installation of officers, presenting the Chairman pin to incoming Chairman M. H. Kline, and a Past Chairman pin to retiring Chairman Paul Weitzman as a token of appreciation from the Chapter.

Surface Finishing

Houston, Tex.—Texas State Hotel was the meeting place for the 65 members and guests present at the February 20 technical session and election of new officers for Chapter 29.

The coffee speaker, Herbert Allen, Vice President of Eng'g. and Mfg., Cameron Iron Works, detailed the use of strain gages. Following Mr. Allen's talk, E. L. Hemingway, Chief Metallurgist, International Detrola Corp., Foster Div., explained many angles of surface finishing, especially on bearing surfaces, well illustrated with slides, charts and graphs.

The screening of a new war film preceded the election of the following officers: Chairman, H. R. Turner, Tools Control; Secretary, L. P. Robinson, Chief Tool Eng., Hughes Tool Co.; 1st Vice Chairman, J. C. Preston, Owner, Preston Mach. Tool Sales Co.; 2nd Vice Chairman, Homer Briggs, Asst. Chief Tool Eng., Reed Roller Bit Co.; Treasurer, D. F. Saurenman, Eng'g. Design, Baker Oil Tool, Inc.

Powder Metallurgy

Kansas City, Mo.—Technical speaker at the February 7 meeting held at the Pickwick Hotel by Chapter 57 was A. J. Langhammer, Pres., Amplex Div., Chrysler Corp., Detroit, who discussed "Powder Metallurgy." Oilite bearings were also included in his address on the making of parts from powdered metals.

Narrating his experiences in the invasion of South France and Normany, Quartermaster P. M. Gould, U.S.N., related something of the supply and maintenance of naval stores and their relation to industrial engines.

An exciting election, in which candidates for several offices were tied, resulted in the selection of: Chairman H. R. Brown, Chief of Tool Eng'g. Aireon Mfg. Corp.; 1st Vice-Chairman, J. E. Bell, Jr., Tool Eng., Pratt & Whitney Aircraft Corp.; 2nd Vice-Chairman, G. B. Smith, Engineer, Vendo Co.; Secretary, J. W. Gallagher, Engineer, Butler Mfg. Co.; Treasurer, L. E. Campbell, Engineer, Benson Mfg. Co.

Roller Bearings

Indianapolis, Ind.—"Application, Care and Maintenance of Tapered Roller Bearings in Machine Tool Equipment" proved highly interesting as presented to Chapter 37 by S. M. Weckstein, Chief Eng., Industrial Div., Timken Roller Bearing Co., Canton, Ohio.

His talk, illustrated by informative slides showing various types of single and double row tapered roller bearings, followed a dinner at Lincoln Hotel and induction of the following new officers: Chairman, H. L. Boese, Works Mgr., Merz Engineering Co.; 1st Vice-Chairman, A. W. Putnam, Experimental Eng.; 2nd Vice-Chairman, Harry Featheringill, Supt. of Production, L. G. S. Spring Clutches, Inc.; Secretary, D. R. Smith, Gage Design Checker; Treasurer, Paul Cave, Gage Dept., Allison Div., G.M.C.

The Horace H. Rackham Educational Memorial

Farnsworth Avenue facade of the Headquarters of the Engineering Society of Detroit and its 28 affiliated technical organizations of which Detroit Chapter, ASTE is one.

Included in post-war plans incorporating the development of Detroit's Art Center and the proposed, new Wayne University Campus, the white marble building and its landscaped grounds occupy an entire city block, facing the Detroit Institute of Arts on the north and the main building of the Detroit Public Library on the northwest.

Auditoriums, offices, secretarial service, meeting rooms, lounges, recreation rooms, a banquet hall, dining room, and library are provided for the use of the various groups, including Detroit Chapter of ASTE.

Endowed through the will of Horace H. Rackham, attorney-philanthropist, who bequeathed part of his fortune for "the establishment, ownership, operation, maintenance and assistance of . . . educational . . . scientific . . . institutions," the memorial also houses, in its west wing, the University of Michigan Extension service and the Institute of Public and Social Administration.

Installation of the newly-elected ASTE National Officers took place March 24th at the Rackham Building in conjunction with a Detroit Chapter meeting featuring Edgar Guest, America's homespun poet.

BRIDGEPORT OFFICERS INSTALLED

Retiring Chairman A. S. Curry, Fairfield County Chapter, pins the Chairman emblem on his successor C. B. Christensen, with Regional Director E. J. Berry (left) and Technical Speaker Hamilton Migel (right) looking on.

Approximately 150 members and guests of the Chapter were given a real treat at the March 7 meeting held at the Algonquin Club in Bridgeport, Connecticut, by Hamilton Migel, Manager of the Magna Flux Corporation of New York. He spoke on "Non-Destructive Testing of Tools," augmenting his address with slides.

The installation of officers which preceded this splendid presentation saw C. B. Christensen, Vice President, Ready Tool Co., installed as chairman, along with C. J. Gluck, Service Engineer, O. K. Tool Co., Shelton, 1st Vice-Chairman; S. R. Duguay, Methods Engineer, Schick, Inc., Stamford, 2nd Vice-Chairman; J. R. Dailey, Vice President, O. K. Tool Co., Secretary; T. J. Keating, Designing Engineer, T. J. Keating Co., Shelton, Treasurer.

Correlates Tool Design With Material Selection

Toronto, Ont.—Speaker of the evening at the March 12 meeting of Toronto Chapter, held in Malloney's Art Gallery, was H. J. Stagg of the Crucible Steel Company of America, Syracuse, N. Y., who discussed "Tool Design with Relation to Tool Steels." Mr. Stagg, in his paper, analyzed the proper and improper design of tools and dies, adequately covering the selection of materials for use with each design and the reasons therefor. The distinctly fundamental address was readily appreciated by the Tool Engineers, metallurgists and heat treaters present.

H. J. Stagg

Preceding this presentation, Elton Miottel of the George Gorton Machine Company, Racine, Wis., spoke briefly in connection with the screening of his company's film, "An Exact Duplicate," an exposition of the many applications of tracer-controlled machines.

New Administration Inducted

York, Pa.—Central Pennsylvania Chapter devoted its March 13 meeting to the nomination, election and installation of officers for the 1945-46 season.

Counting of the ballots by Tellers Austin M. Richard and Floyd E. Gaul revealed that the largest number of votes for the respective offices were given to Preston A. Rickrode, Sr. Process Engineer, Chairman; Eugene A. Siders, Asst. Chief Inspector, York Safe & Lock Co., Vice Chairman; Carey E. Noel, Chief Methods Draftsman, Secretary; Ivan E. Grass, Supervisor of Sheet Metal Work, York Corporation, Treasurer.

Retiring Chairman E. F. Noel inducted the successful candidates into office.

Tool Steel Welding Techniques

Kansas City, Mo.—The story of Eureka tool steel welding electrodes was narrated to Kansas City Chapter by E. E. White, District Sales Engineer, Welding Equipment & Supply Company, Detroit, when they met March 7 at Hotel Pickwick. Technical data presented included metallic arc tool steel welding for the repairing and fabricating of tools and dies. After showing slides, Mr. White conducted a discussion on tool steel welding and repairs on broken tools.

A. J. Mirick, retiring Chairman, administered the oath of office to those elected at the February meeting, presenting the Chapter Charter to incoming Chairman H. R. Brown. The former received a Past Chairman pin in recognition of his record of achievement during the past year.

Cutter Salvage

Erie, Pa.—L. W. Lang, Vice President, National Tool Salvage Co., Detroit, was guest speaker at the meeting held by the local Chapter February 6 in the General Electric Community Center.

His subject, "Cutter Salvage," included remarks on tool control procedure and crib control with a view to attaining the maximum usefulness from metal cutting tools. Their cost, inventory and production advantages resulting from systematic salvage were pointed out, and the possibilities of converting from one type of work to another were shown in a series of slides.

* * *

Retiring Chairman J. C. Wilcox administered the oath of office to the following at the March 6 dinner meeting: Chairman, W. J. Koch, Gen. Foreman; Secretary C. A. Eigabroadt, Chief Draftsman, American Meter Co.; 1st Vice Chairman, H. W. Hagle, Planning Leader, General Electric Co.; 2nd Vice Chairman, R. B. Tousey, Supt., Machine Shop; Treasurer, C. E. Karrfalt, Tool Designer, Lord Mfg. Co.

Chairman Koch introduced the speaker of the evening, Captain C. E. McKinney of the advertising firm, Davies & McKinney, who gave an excellent account of his experiences and associations as an aviator in both World Wars, painting a very vivid picture of what might be expected from returning veterans.

New Duplicating Techniques

Binghamton, N. Y.—Techniques for milling, grinding, and engraving from a master contour were detailed by Elton Miottel, Customer Research Engineer, George Gorton Machine Company, Racine, Wisconsin, at the March 14 meeting held by Binghamton Chapter at Hotel Sherwood, Green, N. Y.

"An Exact Duplicate," the new Gorton technicolor, sound film demonstrating new applications of tracer-controlled machines, supplemented Mr. Miottel's remarks.

Newly-installed officers of the Erie Chapter are shown below. First row, left to right, they are: Karl E. Karrfalt, Treasurer; Robert B. Tousey, Second Vice Chairman; William J. Koch, Chairman; Harold W. Hagle, First Vice-Chairman; John C. Wilcox, Membership Chairman. Second row, left to right, R. G. Karlen, Education Chairman; C. C. Hyman, Entertainment Chairman; G. H. Hogan, Constitution and By-Laws Chairman; F. E. Roach, Public Relations Chairman; R. O. Johnson, Industrial Relations Chairman; Harold E. Spencer, Editorial Chairman; and Carl Eigabroadt, Secretary. R. P. Anderson, Standards Chairman, was not present when the photo was taken.

THE PX

Somewhere in Germany
ASN 35020794
Hq. Co. Maint Bn.
2nd Armored Division
A.P.O. No. 252
c/o P.M., New York

Dear Members:

Just a few lines to let you know how things are over here these days. The life is pretty rugged, and all we do is to make the best of the things we have now. Hope to see the whole thing over with soon. I have been overseas for twenty-eight months and it really is a long time to be away from the good old U.S.A. I keep looking into the future and saying to myself, "I'll be heading that way soon."

I'm in a Headquarters Company of a Maintenance Battalion of the Second Armored Division, doing my share in the Machine Shop Section, making and repairing things that come in. We have a big lathe with a swing of 16"x5', a small one 10"x3', and a drill press all in one truck. In the other, we have a number two milling machine, cutter grinder, small drill press, and power press for pressing tires on tank wheels. Each truck has benches and portable tools to work with.

Lately we have been making things on production in a comparatively small place, producing as many as two hundred of an item which we never made before. We have to do this to keep this division on the line. One never knows what is to be done next, but we do our best to keep up with the division on the move. You couldn't imagine what we can do when we have to, unless you were here to see for yourself. We are on the move now, hope to reach Berlin soon and go back home.

So I close this letter to you fellow members, giving you all my best regards from somewhere in Germany on the way to Berlin.

A fellow member
Adolph M. Usay
Cleveland Chapter

* * *

Gentlemen:

Sometime ago I received your letter in which was enclosed my membership card certifying that I am "a member of the American Society of Tool Engineers, now serving in the Armed Forces."

You may be sure that it is with a great deal of pride that I carry my card to show that I am connected with such a worthwhile and progressive society. Even though at present I am in a different field than formerly, I like to keep up-to-date as to what is happening in engineering, and it is through my contact with the organization that I am able to do so.

In your letter you stated that you would welcome any message that I might wish to send, so I'm availing myself of the opportunity thus presented with this result. Hoping to hear from you all.

I remain,
Respectfully yours,
George R. Widney S 1/c
Los Angeles Chapter

New Haven Chapter Officers at work. Left to right around the table: Raymond Gifford, Assistant Secretary; Floyd W. Braynard, Treasurer; Alton V. Pollard, Secretary; John F. Sargent, Chairman; Frank A. Shute, Vice Chairman; Maur J. Weldon, Retiring Chairman.

Employs Novel Method For Appointing Committees

Cleveland, Ohio—An innovation in appointing committees has been inaugurated by Chairman J. I. Karash, who has extended to the entire membership of Chapter 3 an invitation to volunteer for work on the committee in which each is most interested.

J. I. Karash

His objective of having every member a part of at least one committee is expressed in a letter soliciting individual cooperation in the conduct of the Chapter. A return post card enclosure, listing and describing existing committees and encouraging suggestions for new ones, permits a wide latitude of choice.

Charters 70th Chapter

Muncie, Ind.—Impressive ceremonies marked the chartering of Chapter 70 at Hotel Roberts, March 7.

Acting Chairman W. H. Vickers presented National Secretary E. V. Johnson who conducted the election and installation of the following officers: Chairman, J. D. Rovick, Field Eng., Michigan Tool Co.; 1st Vice-Chairman, W. H. Vickers, Tool Des., Warner Gear Co.; 2nd Vice-Chairman, R. L. Waters, Tool Eng., Durham Mfg. Co.; Secretary, J. C. Rutter, Jr., Chief Designer, Interstate Machy. Tool & Eng'g., Albany; Treasurer, C. C. Crabb, Tool Des., Delaware Mach. & Tool Co.

Chairman Rovick received the Charter and Chairman pin on behalf of the Chapter, appointing as committee chairmen: William E. Swank, Master Mechanic, Kitselman Bros., Constitution and By-Laws; N. Francis Wilson, Method Engineer, Perfect Circle Co., Hagerstown, Editorial; Barclay M. Reed, Tool Designer, Delco-Remy, Membership; J. J. Stillwagon, Contact Engineer, Interstate Mach. Tool & Eng'g., Albany, Industrial Relations; R. E. McLaughlin, Engineer, Durham Mfg. Co., Standards; W. H. Vickers, Tool Engineer, Program; Earl G. Kelsey, Tool Designer, Warner Gear Co., Entertainment; Hill Sharpe, Tool Designer, J. & M. Engineering, Public Relations; William J. Brown, Tool Engineer, Chrysler Corp., New Castle, Education.

Active in the organization of the group, Richmond Chapter Chairman D. B. Showalter was a guest speaker at the inaugural meeting.

Precision Dies, Tools

New Haven, Conn.—J. R. Moore, Secretary, and Edward Dobelstein, Supt., Moore Special Tool Co., Bridgeport, an excellent speaking team, discussed "High Precision Dies and Machine Tools" at a meeting held by Chapter 41 March 8 at George and Harry's Restaurant.

Their splendid presentation, illustrated with blackboard drawings and sample parts, included a description of the operation of high precision jig borers and jig grinders.

K. F. Thomas of Hartford Chapter inducted into office Chairman, J. F. Sargent, Foreman, R. Wallace & Son Co., Wallingford; 1st Vice-Chairman, F. A. Shute, Sales and Service Eng., D. A. Stuart Oil Co.; 2nd Vice-Chairman, and Secretary, A. V. Pollard, Gen. Foreman, Die Dept., American Brass Co., Ansonia; Treasurer, F. W. Braynard, Sales Mgr., H. E. Chellis Co., Hamden.

* * *

The blizzard-postponed February meeting took place on the 15th with W. H. Oldacre, Pres. and Gen. Mgr., D. A. Stuart Oil Co., Chicago, discussing "Machine Tool Lubrication." Mr. Oldacre handled his topic ably, covering research for the improvement of lubricants, various types used, as well as the importance of the proper lubrication of machine tools.

Election of officers preceded the technical session.

Elected Caterpillar Vice President

Decatur, Ill.—Lloyd J. Ely, Works Manager of Caterpillar Military Engine Company since its incorporation early in 1942 and a charter member of Decatur Chapter, was recently elected a Vice President of his company.

Lloyd J. Ely

Prior to his assignment as Works Manager of the engine division, Mr. Ely had been associated since 1916 with the parent organization, Caterpillar Tractor Company, and its predecessor, Holt Mfg. Company.

During that time he acquired an unusually broad and thorough knowledge of all their manufacturing activities, having worked as a machinist, machine shop foreman, machine shop superintendent, on special assignments in the Planning Department and Foundry, and as Assistant Factory Manager of Caterpillar Tractor Company.

Precisioned Programs Double Attendance

San Diego, Calif.—Intelligent planning of well-balanced programs, plus written meeting procedures and visual calendar schedules of deadlines and meeting dates, have increased attendance at Chapter meetings 100% during the past season, according to Gerald R. Bradbury, former Second Vice Chairman, and Tool Designer, Consolidated Vultee Aircraft Corp., who reports:

G. R. Bradbury

"We were faced with many problems when we took office last March. After a careful analysis, we felt that in order to stimulate member interest, we would have to offer better programs, conducted by written procedure so that each officer would know his specific part in the program. The Chairman prepares copies of this meeting procedure for all participating officers who assemble before the meeting opens to discuss final details and make last minute changes.

"Most of our meetings adjourn by 10:00 p.m., although our programs are comprehensive, including one technical subject, a general interest speaker, and films. We have been offering outstanding local executives as featured speakers, stimulating not only the members but also management in becoming increasingly aware of ASTE as a factor in the industrial field. By offering programs designed to interest the majority, we have overcome much former indifference.

"Another idea that we have used with great success is a calendar schedule [see illustrations] *distributed to all officers and committee chairmen, with Chapter meeting, program meeting, program printing and mailing dates indicated.*

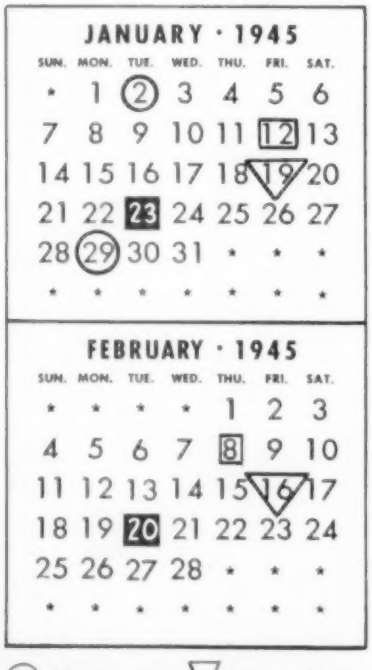
"A much smoother organization has resulted, with the Executive Committee cognizant of the status of the programs."

A general outline of the program procedure, referred to by Mr. Bradbury, now Public Relations Chairman, follows: 1. Chairman will call meeting to order and request reading of minutes of previous general meeting, by the Secretary. 2. Chairman will ask for approval or corrections of minutes. 3. Chairman will call on Treasurer for reading of report, and approval or comment. 4. Chairman will request all new business to be presented and discussed and referred to proper Committee Chairmen.

5. Chairman will request reports from Committee chairmen. 6. Chairman will extend general welcome to all guests. 7. Chairman will introduce Program Chairman who will conduct the presentation of the program. 8. Program Chairman will introduce coffee speaker, asking for questions from the floor at the conclusion of the discussion, if they are in order. 9. Program Chairman will thank speaker and introduce technical speaker, following the same procedure.

10. Films will be shown illustrating talk and subject of evening. 11. Program Chairman, at the close of the program, will turn the meeting back to the Chairman who will thank speakers for efforts and members and guests for attendance. 12. Chairman will make or have made announcement of next meeting. 13. Chairman will adjourn meeting.

In his report to National Headquarters, one of the speakers addressing this Chapter commented favorably on this procedure, stating, "this Chapter is organized to the nth degree."



Obituaries

Lawrence J. Orton

Lawrence J. Orton, aged 48, Production Manager of the South Bend Tool & Die Company, died in Epworth hospital recently, following an illness of three weeks.

A native of Indianapolis, Mr. Orton had been located in South Bend for eighteen years, the past twelve of which had been spent in the employ of the South Bend Tool & Die Company.

Besides his affiliation with South Bend Chapter of ASTE, Mr. Orton was a member of the Masonic order, the Elks Lodge, Morris Park Country Club, Chain of Lake Gun Club, and the Society for Preservation and Encouragement of Barber Shop Quartet Singing in America. He also served in the Navy during World War I.

* * *

William F. Armstead

William F. Armstead, Machine Shop Foreman at the Weaver Manufacturing Company, Springfield, Lllinois, recently passed away at the age of 38, following an illness of five months.

Born in New Berlin, Illinois, Mr. Armstead had been associated with the Weaver Company in various capacities since 1923. He was a charter member of Springfield (Ill.) Chapter, ASTE.

Bertram B. Quillen

Bertram B. Quillen, 75, president and founder of The Cincinnati Planer Company, the Acme Machine Tool Company, and a nationally-known authority on machine tools, died suddenly at his home in Cincinnati, recently.

Bertram B. Quillen

A native of Lebanon, Indiana, Mr. Quillen was one of the pioneers in establishing Cincinnati as a machine tool center, beginning his industrial career with Lodge and Davis Machine Tool Company, where he was employed until he founded the Cincinnati Planer Company.

In addition to heading the two machine tool companies, Mr. Quillen, a member of Cincinnati Chapter, ASTE, was a director of the First National Bank of Norwood, a member of the advisory board of the Oakley branch of the Fifth Third Union Trust Company, president of the Machinery Bowling League, and a member of the Cincinnati Club, Queen City Club, Hyde Park Country Club and the Oriental Order of Groundhogs.

Injurious Vibration Converted To Harmless Radiant Heat

Flint, Mich.—Approximately 90 members and guests assembled March 15 for the second meeting of the newly-chartered Flint Chapter, when a splendid program on "Vibration" was presented.

Following the dinner meeting in the cafeteria of the General Motors Institute, A. E. Fyffe, Experimental Engineer, A. C. Spark Plug Division, spoke on the engineering difficulties encountered, through vibration, in the production of bombsights and other instruments, describing the corrective measures employed.

After adjournment to the auditorium, Chairman Michael Skunda introduced Dr. C. W. Chamberlain of the Chamberlain Laboratories, East Lansing, who delivered an address on "Vibration Dampening." Dr. Chamberlain, who is also Professor of Physics at Michigan State College and Research Professor of Physics at Columbia University, explained the construction of a vibration absorber to convert mechanical vibration energy into harmless radiant heat.

Approximately 50 thin sheets or discs of copper with a film of oil 5 molecules thick on each side are compressed under 25,000 pounds pressure per square inch forming an almost solid block ¼" thick, while leaving approximately a quarter-millionth inch of air between the discs.

This assembly, which is hermetically sealed in a steel jacket, will be available in the post-war period for mounts where any type of vibration is to be overcome, the speaker said.

Benefits of Research Presented to Executives

St. Catharines, Ont.—Applied research as a means of increasing production through the improvement of existing manufacturing methods and the creation of new industries was discussed by E. H. Gurney, Chairman, Ontario Research Foundation, Queen's Park, Ontario, before the first annual Executives Night held March 16 at Welland House, by Niagara District Chapter.

E. H. Gurney

The speaker, who is also President of Gurney Foundry, Ltd., Toronto, in his address, "Applied Research and Quality Control," described the operations of statistical control in a foundry, an inspection system to determine variable factors such as the properties of raw material, its composition and temperature, making possible rigorous control of the quality of the product.

Using charts, he showed how scrap loss had been reduced from 15 to 20 per cent to 2 to 4 per cent. While he pointed out that the system offered more possibilities in a machine shop, where greater control is customarily exercised, Mr. Gurney indicated that it was a dangerous tool in the hands of the inexperienced. He added that the Ontario Research Foundation, a non-profit organization, hoped to expand its operations to be able to extend technical assistance to any industry in Canada.

Retiring Chairman C. D. Wright reviewed the activities of the Chapter's first year during which membership has doubled. Outstanding technical programs have been presented, gadget talks inaugurated, and question periods conducted, based on written problems submitted in advance. Meeting costs are covered in the dinner charge without resorting to program advertising.

Education has been fostered for four years by members teaching tool engineering subjects at the local trade school.

A rotating committee of three non-executive members is invited to attend and participate in Executive Committee meetings in order to become better acquainted with the administration and organization of Chapter activities.

New officers installed by Mr. Wright included: Chairman Henry Hendriks, Engineer; 1st Vice Chairman Henry F. Gorth, Master Mechanic, Lightning Fastener Co.; 2nd Vice Chairman J. Clarke Gelling, Manager, Buffwell Eng. & Mach. Co., Welland; 3rd Vice Chairman W. Lloyd Sandham, Tool Engineer; Secretary G. Frederick Bush, Tool Metallurgist; Treasurer Clifford G. Bradford, Checker and Estimator, McKinnon Industries Ltd.

* * *

At the February 16 meeting held at the Foxhead Inn, Niagara Falls, the annual election of officers was conducted.

J. S. Johnston of the Dominion Oxygen Company, Ltd., speaker of the evening, outlined the many applications of the oxy-acetylene flame, including its use in cutting forms, trimming sheet steel, and in flame hardening. Slides illustrated the talk which was followed by a stimulating discussion period.

FILM FLASHES

* *B-29 Over Dixie*—Filmed in one of the Southern plants producing B-29's, the great assembly lines of these huge Boeing-designed ships are shown for the first time. The development of a new industrial region and the improved living conditions for workers are emphasized.

Bell Aircraft Corporation, Motion Picture Division, 2050 Elmwood Ave., Buffalo 7, New York, will lend the 16mm., 20-minute sound film to recognized organizations.

* * *

* *Electronics At Work*—The principle of the electronic tube and its six basic functions are made clear in sound film sequences and simple diagrams. Electronic devices are shown at work in industry, providing the vast quantities of direct-current electricity needed for making aluminum and magnesium, speeding up welding processes, and helping to produce tin plate by methods that use two-thirds less tin. Their uses in radio, hospital and home equipment are also demonstrated. Running time, 20 minutes.

* * *

Music In The Sky—Provides a front-row studio seat at a popular Sunday afternoon radio show, starring John Charles Thomas. As the "on-the-air" signal is about to be flashed, you see technicians in split-second timing, preparing to send this national program to over a hundred broadcast stations who simultaneously make it available to millions of listeners. You feel the tenseness of the last half-minute before broadcast time when everyone is still—all eyes focused on the director—waiting for his signal to begin the program.

The entire broadcast is depicted, providing 16 minutes of delightful entertainment, as well as an educational story of the inside workings of a network musical show.

* * *

On The Air—How programs are written, built, rehearsed, timed, produced, and the manner in which they reach the listener through the circuits of a modern high-power transmitter are revealed in this sound-film backstage tour of Radioland.

Broadcasting is reviewed from its beginning up to the present national network system. There is a technical section, animated drawings, and layman-language narration. Of particular interest is a demonstration of the simple devices used to create realistic sound-effects.

Clearly explained are the two main waves used in broadcasting—the original auto-frequency wave and the radio-frequency carrier wave upon which it is superimposed, making a complex and abstract subject exceptionally lucid and interesting. Running time, 28 minutes.

The three above-described films are available in 16mm. or 35mm. from the Motion Picture and Speakers Bureau, Westinghouse Electric & Mfg. Co., 306 Fourth Ave., Pittsburgh 30, Pa.

* * *

Highway to Alaska—While depicting some of the difficulties encountered in constructing the "Alcan" highway, the 16mm., color film principally portrays the beauty of the landscape, the rugged terrain, the mountain scenery, condition and life along the highway, and a glimpse into Alaska proper. Running time—20 minutes.

May be borrowed from Allis-Chalmers Mfg. Company, Milwaukee, Wis.

* *Literature available from National Headquarters.*

Niagara District Chapter Executive Committee, 1945-46. Seated, left to right: Treasurer, Clifford G. Bradford, Chairman Henry Hendriks, Secretary G. Frederick Bush. Standing, in same order: Third Vice-Chairman W. L. Sandham, First Vice Chairman Henry F. Gorth, Second Vice Chairman J. Clarke Gelling.

Editor Discloses Postwar Automotive Prospects

Detroit—Will the new automobile have a rear end motor . . . a plastic body . . . teardrop design? Will the precision, mass production methods, developed in wartime, lower the price and prolong the life of the peacetime car?

These and many other questions were answered for members of the Women's Advertising Club of Detroit when Joseph Geschelin, Detroit Editor, Chilton Publications, addressed them recently on the subject of "Postwar Potentialities of the Automotive Market."

Estimating an existing unsatisfied demand for 12,000,000 motor vehicles, the speaker quoted statistics indicating that 49.4 per cent (12,604,840) of the vehicles now on the road are at least eight years old, 30.1 per cent are of the vintage of ten or more years ago, while only 23 per cent came off the production lines within the past five years. On this basis, the postwar program assumes enormous proportions with plenty of manufacturing demand for everyone concerned.

He emphasized the tremendous influence exerted on design and progress in the field of automotive manufacturing by the 3000 to 4000 specialists who supply a wide variety of parts to motor car companies, truck producers, tractor and engine builders.

As an example he cited the improvement in piston rings resulting from the demand for precision and superior surface finish in those used for aircraft. Gear shaving has resulted in quieter and smaller transmissions with corresponding reduction in weight.

While accelerated war production of new materials such as aluminum, magnesium, plastics and high tensile steels will assure peacetime abundance, availability will be no indication of their market. Engineers must develop unique and useful applications for raw materials producers to sell to designers. Sample cars, utilizing these materials, should be constructed and demonstrated to prove their desirability to manufacturers.

Pointing out the superiority of some substitute materials, Mr. Geschelin indicated that it was unlikely that inner tubes would ever be made of natural rubber again since butyl synthetic tubes hold air three times as long.

The popular public expectancy of plastic bodies has no foundation in plastics or automotive circles where the limitations of these materials are known. They will continue to be used for accessories, trim, and possibly to replace upholstery in lining interiors. Torsion bars, now used instead of springs in tanks and busses, may have similar applications in passenger cars. While gas turbine motors cannot yet be made small enough for automobiles, their use in the future is possible in conjunction with high octane gas when production of these fuels has increased sufficiently to reduce the cost.

Decreased weight through the application of cycle welding is another important prospect.

Complete redesigning and retooling will be necessary to evolve a rear-end motor propelled car—a development not expected within five years after the resumption of production.

Newly-developed machine tools, processes and techniques may be instrumental in offsetting a higher wage scale by speeding productivity and reducing prime costs. These innovations include the use of electronics for controlling and actuating mechanical processes, induction heating, hardening and brazing; new forging and heat treating methods, wider use of welding and fabricated structures, improvements in surface finishes for rotating and wearing parts, extending the life of expensive parts of the mechanism of a motor car.

Although no manufacturer can predict what his post war product will be, sufficient detail changes can be effected to produce a new model based on 1942 designs for which complete tooling is available.

Demands of the Army and Navy for spare parts needed for operations in the Pacific may defer reconversion which is expected to require three or four months before production could start. Out of fairness to manufacturers who may have to continue with government work to meet these needs, some consideration has been given to the production, by a number of companies, of a nameless, standard car to tide over the immediate transportation crisis. Mr. Geschelin estimated that three million cars would roll off the lines during the first year.

Portland (Ore.) Chapter installed new officers at the March 22 dinner meeting in the Mallory hotel. From left: R. L. Smith, First Vice-Chairman; W. E. Brennan, Treasurer; G. E. Healy, Second Vice-Chairman; Ray E. Neils, Chairman; J. R. Barrett, Secretary; and Eugene Butzer, Past Chairman and installing officer. Speaker of the evening was W. E. Wing of San Francisco, Cleveland Twist Drill Company representative, whose subject was "Uses and Abuses of Twist Drills." A Bethlehem Steel Corp. sound film on the making of alloy steels completed the program.

Tools Up Musical Designs

Columbus, Ohio—Since the publication of Roy Parkinson's extrusion milling achievements, in the March issue of *The Tool Engineer*, some of his more aesthetic accomplishments have come to light through the good offices of his Chapter.

Roy Parkinson

Mr. Parkinson, Assistant Section Head, Tool Design Department, Curtiss-Wright Corporation, and a native of Buffalo, was pianist and arranger for two years with Vincent Lopez at the Hotel Statler in that city.

More recently he has done some excellent arranging for the Curtiss-Wright Male Chorus. In fact, whenever the occasion presents itself, Roy does a splendid job of tickling the ivories, as was evidenced at the 1944 Chapter Christmas party when he played the piano and led the boys in displaying their vocal talent.

ASTE President Inducts Chapter 9's Officers

Toledo, Ohio—At the March 21 annual Meeting of Toledo Chapter held at the Secor Hotel, President D. D. Burnside, the installing officer, inducted the 1945 executive group, presenting the Chapter's gift of a Past Chairman pin to retiring Chairman Clester A. Colwell.

Those accepting the responsibilities of leading the Chapter for the coming year are: Chairman, Samuel W. Burgess, Tool Engineer, Electric Auto-Lite Co.; First Vice Chairman, V. G. Kessler, Tool Supv., Spicer Mfg. Corp.; Second Vice Chairman, R. L. Wibel, Liaison Engineer, Willys-Overland; Secretary, Roy J. Dusseau, Chief Tool Engineer, Northern Aircraft Products; Treasurer, Elmer R. Walborn, Tool Supervisor, National Supply Co.

A number of distinguished guests, including industrial and business executives, were introduced by Toastmaster Robert C. Dunn, prominent Toledo attorney.

Regional Director A. M. Schmit also spoke briefly on topics of local interest.

The speaker of the evening, Dr. Philip C. Nash, President of the University of Toledo, delivered an address on "An Adventure In World Order," discussing the Crimean Conference and the Dumbarton Oaks Proposals.

Snapped at Toledo Chapter Installation Night, March 21, left to right: Chairman Samuel W. Burgess; Guest Speaker, Dr. Philip C. Nash, President of University of Toledo; Toastmaster, Robert C. Dunn, prominent Toledo Attorney.

Officers, past and present, Rochester Chapter. Left to right: Retiring Chairman Chauncey Newton, Past Chairman Charles Codd, Chairman Earle De Bisschop, Second Vice-Chairman Milton Roessel, Third Vice-Chairman Herbert O. Simon, Secretary Donald Kohler.

Duplicating and Optical Glass Co-Featured

Rochester, N. Y.—Approximately 200 members and guests of Rochester Chapter met March 13 at the Rochester Institute of Technology for an installation program and technical session featuring Elton Miottel, Customer Research Engineer, George Gorton Machine Company, Racine, Wis.

Elton Miottel

Officers elected at the February meeting were inducted by Past Chairman Charles Codd who presented the gavel to Chairman Earle De Bisschop, with Retiring Chairman Chauncey Newton transferring the Chapter Chairman pin and charter to Mr. DeBisschop.

The following heads of committees were appointed by the new Chairman: Bernard E. Williams, Tool Engineer, Taylor Instrument Co., Constitution and By-Laws; E. LeRoy Hand, Supv. of Methods, Gleason Works, Editorial; Ernest G. Straw, Manager, Rochester Office, Ex-Cell-O Corp., Membership; Emmett W. Moore, Chief Tool Engineer, Industrial Relations; Charles E. Codd, Master Mechanic, Ritter Co., Inc., Historical; William R. Gordon, Chief Tool Engineer, Eastman Kodak Co., Camera Works, Standards; Charles L. DeMartin, Vice President, Lucas Screw Products, Inc., Program; Robert T. Barnett, Tool Engineer, Public Relations; Earl T. Gruendike, Factory Supt., General Railway Signal Co., Utility; Sherman Hagberg, Supv. of Machine Shop Instruction, Rochester Institute of Technology, Education; James O. Horne, President, James O. Horne Co., Entertainment; Russell Howard, Process Engineer, Bausch & Lomb Optical Co., Delinquent Membership.

"Vision for Victory," an excellent film, depicting the making and use of optical glass in its various forms, was shown, giving first-hand information of operations at Bausch & Lomb Optical Company.

Mr. Miottel, the technical speaker, amplified his company's Kodachrome film, "An Exact Duplicate," which depicted the various uses of duplicating machines, including both manual and electrically-operated tracers. He also displayed a number of intricate and interesting items in the process of manufacture.

Director Inducts West Coast Officers

Seattle, Wash.—Installation of new officers for Seattle Chapter was conducted by Regional Director W. Carl Fields March 13 at a meeting held in Hotel Gowman.

Arthur G. Means, Jr., Chief Assembly Tool Engineer, Boeing Aircraft Company, heads the new executive group as Chairman, with L. C. Gibson, Tool Staff Engineer, of the same Company, First Vice Chairman; L. E. Eward, President, Eward Associates Inc., Second Vice Chairman; Kenneth Bergerson, Tool Group Engineer, Boeing Aircraft Co., Renton, Secretary; and Orville Dawson, Tooling Engineer, Boeing, Seattle, Treasurer.

Conrad Mattson (left) retiring Chairman, Seattle Chapter congratulates his successor, Arthur G. Means, Jr.

Mr. Fields also presented a Past Chairman pin, on behalf of the Chapter to retiring Chairman Conrad Mattson, complimenting all the outgoing officers on their year's work.

Merits of Superfinishing Compared with Grinding Finishes

Columbus, Ohio—E. L. Hemingway, Chief Metallurgist, International Detrola Corporation, Elkhart, Indiana, held the close attention of Columbus Chapter members and friends when he discussed "Cause and Control of Surface Damages" at the April 12 dinner meeting held in Fort Hayes Hotel.

E. L. Hemingway

Using slides to accent the highlights of his address, Mr. Hemingway explained the basic principles of superfinishing, comparing it with grinding finishes, as well as the single purpose and multiple or high production superfinishing machines. His answers to questions from the floor and the display of samples contributed much to the effectiveness of the presentation.

In an earlier report of the annual election of officers, Columbus Chapter inadvertently omitted the name of Professor J. N. Edmondson, Engineering Dept., Ohio State University, who was elected to the Second Vice Chairmanship. Chapter Committees, for 1945-46, will be headed respectively: Constitution and By-Laws, S. M. Mack, Chief Tool Engineer; Editorial and Public Relations, Earl W. Siegel, Machinery Engineer; Entertainment, Thomas F. Starkey, Engineer, Curtiss-Wright Corp.; Membership, Henry T. Spoerlein, Engineer, Ranco, Inc.; Industrial Relations, Frederick W. Plapp, Engineer, Denison Eng. Co.; Standards, Charles R. Scheuring, Engineer, International Stacey; Program, W. E. L. Bock, Engineer, Superior Die & Tool; Education, J. N. Edmondson, Asst. Prof. Engineering, Ohio State University.

Plans are being developed for an early summer picnic, the definite date to be announced later. Members of other Chapters who expect to be in the vicinity of Columbus during mid-June weekends are cordially invited. Chairman Howard F. Volz should be advised by those planning to attend.

Among those installed at the March 13 meeting of Northern New Jersey Chapter in Newark were, left to right below: Treasurer Andrew G. Staller, Herbert Hall Co.; Assistant Secretary-Treasurer A. J. Schmidt, Die Casting Engineer, Eclipse Aviation, Pioneer Div., Teterboro; Chairman Frank L. Delhagen, Supervisor, Western Electric Co., Bayonne; and Secretary H. Wilson Ryno, Owner, H. Wilson Ryno Co.

First Vice Chairman John Webster, Supervisor Eclipse Aviation, Pioneer Div.; and Second Vice Chairman Remo Rege, Master Mechanic, Wright Aeronautical Corp., Paterson, were not present when the photograph was taken.

Technical speaker was H. L. Murch, Optical Engineer, Comparator Dept., Jones & Lamson Machine Co., Springfield, Vt., who spoke on "Measuring and Inspection by Projection."

Photo courtesy H. J. Hummer, American Can Co.

Education Committee Collaborates in New Tool Design Text

Rochester, N. Y.—Publication of the first volume of "Elementary Jig and Fixture Design," presenting a much-needed contribution to tool engineering education, represents the active participation of the ASTE National Education Committee in advancing knowledge of its profession.

Recognizing and anticipating the need of educators and instructors of wartime tool design training classes, for suitable literature covering this field, the New York State Education Department and the since-merged ASTE Emergency Defense Training Committee have been cooperating in the preparation of a tool design textbook in conjunction with their concurrent collaboration on machine shop practice subjects.

Despite the relatively greater urgency for the latter material and the painstaking pioneering involved in compiling the tool design text, Volume I of "Elementary Jig and Fixture Design," just published, is expected to be followed by Volume II, nearing completion, in about six months.

This work, patterned after the outstanding and eminently successful New York State Machine Shop Training Monographs, has not only the society's full endorsement, based upon critical review, but also its assistance in writing, preparation and editing.

Functioning under the direction of Ewald L. Witzel, Supervisor of the Curriculum Construction Laboratory of the New York State Education Department, the committee active in the project is composed of William Auer, Joel M. Coryell and Russell G. Howard, Rochester Chapter, ASTE; Elmer A. Rotmans, Robert H. Barnes, and Elmer P. Meulendyke of the Rochester Education Department, with ASTE National Education Chairman O. W. Winter serving as technical consultant and conducting the final review.

Representing the first of a series of Tool Design monographs, the joint New York State-ASTE project should, when completed, adequately cover the entire field. Issues subsequent to Volume II of Elementary Jig and Fixture Design will include (1) Punch and Die Design, (2) Gage Design, (3) Cutting Tool Design, (4) Plastic and Die Casting Design, (5) Forging Die Design, (6) Advanced Jig and Fixture Design.

Development of the quality of inventiveness and ingenuity that characterizes tool engineering and tool designing is encouraged throughout this material. Instead of the usual visual treatment, the book, through design assignments, compels the student to work out his own designs.

Volume I consists, first, of an extensive outline of Tool Design principles and Practice covering Volume II and some of the more advanced text planned for the future.

Introduction to Tool Design, Function of Jigs and Fixtures, Jig and Fixture Design, How the Designs of Jigs and Fixtures Are Planned, Tool Drawings, and Descriptions of Units of Instruction constitute the Chapter headings in the introductory section which is followed by five complete units of instruction. (Volume II will contain 25 additional units.)

Guests seated at the head table, March 8 meeting of Schenectady Chapter held in Hotel Hendrick Hudson, Troy, N. Y., included, left to right: N. Y. Coxe, Chapter Secretary; R. H. Wilke, Chapter Treasurer; E. S. Floring, First Vice-Chairman, Syracuse Chapter; H. D. Mozeen, Regional Director; C. J. Sertl, Retiring Chairman; Technical Speaker I. L. Burrows, Behr-Manning Corporation; E. H. Girardot, Chairman; D. M. Schiele, First Vice-Chairman; and B. L. Hayner, Second Vice-Chairman.

Each unit consists of the three following sections: 1. Basic Principles—An illustrated outline and description of the basic principles of the types of jigs and fixtures included in the unit; 2. Design Description—An illustrated and detailed outline and description of the tools required for the production of a given part; 3. Design Assignment—An assignment to design the tooling for a similar part to that described above. A brief outline of hints is included to help the student.

Instruction units comprising Volume I include Simple Drill Templates, Simple Angle Plate Milling Fixtures, Plate Type Drill Jigs with Clamping Screws, Milling Machine Vise Jaws for Flat Plates, Plate Type Drill Jigs with Clamps and Legs, Straddle Milling Fixtures, Channel Type Drill Jigs, Angle Plate Tapping Fixtures, Vice Held Milling Fixtures, and Combination Drill and Assembly Jigs.

Volume II will continue with Compensating Vise Jaws for Irregular Shapes, Open Type Drill Jigs, Plate Type Milling Fixtures, Reaming Jigs, Profiling Fixtures, and so forth.

Six appendices to Volume I give supplementary information on Suggestions for the Tool Designer, Steels Common to Tool Construction, Heat Treatment of Steels Used in Tool Construction, Drill Jig Bushings, Component Parts of Jigs and Fixtures, and Tolerances and Allowances.

Suitable for technical institutes and fully accredited engineering colleges teaching tool design, or for home study and correspondence training, this material, financed by the U. S. Office of Education, will be available at cost as are the preceding monographs.

Honored By Ordnance Association

Dayton, Ohio—Louis Polk, President of the Sheffield Corporation, and member of Dayton Chapter, ASTE, has been awarded the Gold Medal of the Army Ordnance Association for outstanding service. Presentation of this national award, which is inscribed, "To Louis Polk for outstanding service to Army Ordnance," was made on behalf of the Association's President, Brigadier General Benedict H. Crowell.

Louis Polk

Mr. Polk, who has been instrumental in the development of measuring instruments and gaging system standardization with Ordnance, is active as a director of the Cincinnati Post.

New Angles on Abrasive Applications

Schenectady, N. Y.—More than 200 members and guests of Schenectady Chapter journeyed to Troy March 8 to attend the "Behr-Manning Night" dinner meeting at the Hendrick Hudson Hotel.

Regional Director H. D. Mozeen of Syracuse installed the recently-elected officers: Chairman, E. H. Girardot; First Vice-Chairman, D. M. Schiele; Second Vice-Chairman, B. L. Hayner; Third Vice-Chairman, W. H. Powell; Secretary, N. Y. Coxe; Treasurer, R. H. Wilke.

Chairman Girardot, announcing committee chairmen for the coming year, named: Edgar J. Smith, Asst. General Foreman, as Constitution and By-Laws Chairman; George R. Herold, Tool Designer, Editorial and Public Relations; George S. Nelson, Ratesetter, Membership; Fred J. Diehl, Supervisor, Tool Design, Standards; Delbert M. Schiele, Ratesetter, Program; Ray E. Ellis, Works Manager's Staff, Education; Floyd B. Barnes, Tool Designer, Entertainment, all of General Electric Co., and John Stedman, Tool Designer, Behr-Manning Corp., Industrial Relations.

"The Manufacture of Sandpaper and Other Abrasive Items" was presented by I. L. Burrows of the Behr-Manning Corporation, Troy. After outlining the manufacture of abrasives, Mr. Burrows made recommendations on their correct usage, quoting several instances where sandpaper, specially constructed and used in special machines, was actually used in the manufacture of tools. This equipment was included in a display prepared by the company's Product Development and Engineering Department.

Carbide Milling Expert Explains Techniques

Houston, Texas—Dr. H. A. Frommelt of Kennametal, Inc., Latrobe, Penna., held the undivided attention of 90 members and guests of Houston Chapter in an engrossing lecture on "Carbide Milling" March 13 at Texas State Hotel. His subject, which included the correct design and application of carbide milling cutters, was illustrated with color slides.

Preceding Dr. Frommelt's address, W. F. Wilson of Wilson Electrical Equipment Company, gave a very informative talk on "Electrical Wiring of Modern Industrial Plants."

Completing the technical program, the sound film, "Oil for Tomorrow," was shown through the courtesy of the Humble Oil & Refining Company.

Chapter Officers elected at the previous meeting were installed by Past Chairman Chris A. Vogt.

Inducts Officers With Impressive Rites

San Diego, Calif.—In an impressive ceremony, the recently-elected officers of San Diego Chapter were inducted March 16 at the San Diego Women's Clubhouse.

The oath of office was administered by Constitution and By-Laws Chairman William Connell to Chairman W. F. Asmus, Supv. Tool Design; Secretary Jerome J. Groff, Tool Planner; Treasurer Jess E. Birney, Tool Designer, Consolidated Vultee Aircraft Corp.; First Vice Chairman Paul H. Whitmoyer, Asst. Chief Tool Designer, Rohr Aircraft Corp., Chula Vista; and Second Vice Chairman Sherm C. Brunton, Prod. Design Engineer, Ryan Aeronautical Co.

Mr. Connell in his inspiring address, charging each incumbent with the obligations, privileges and dignity of his respective office, said:

"The members of San Diego Chapter at regular election have selected you—each of you—for a designated office. In so doing they have conferred an honor, demonstrating their confidence in you and your abilities. In accepting the office to which you have been elected, you also accept the responsibilities thereof.

"You are each acquainted with your duties, and it is hoped that, under your guidance, Chapter 44, American Society of Tool Engineers, will enjoy another constructive year—a year progressively better than any that has gone before.

"Mr. Asmus, as Chairman, it is your duty to conduct the meetings of the organization in a business-like manner, in accordance with the Constitution and By-Laws of the Society; to aid and advise the officers and counsel the members.

"Mr. Whitmoyer, as First Vice Chairman, it is your duty to assist the Chairman; to preside over the meetings in his absences, and to perform such other duties as may be assigned.

"Mr. Brunton, your duties as Second Vice Chairman are numerous, chiefly as assigned by the Chairman, but basically that of a morale builder among the members and a contact with the public as well.

"Mr. Groff, as Secretary, it is your duty to keep a true and complete record of the proceedings of all Chapter and Executive Committee meetings; to handle correspondence speedily and efficiently.

"Mr. Birney, your duties as Treasurer are to receive and bank all monies due the Chapter, paying out money owed, by voucher only; to maintain a complete record of all financial transactions and to surrender to your successor all bills due and/or payable, all monies and financial records of your term of office.

"As officers of the local Chapter you are the recognized leaders of the American Society of Tool Engineers in this district and it is essential that your conduct will, at all times, reflect credit upon yourselves, the Chapter, and the American Society of Tool Engineers in general. And, further, that you make all possible effort toward recognition, rather than passive acceptance by Industry and the public at large, as those who design and build the tools, plan the work which makes mass production possible—those men who, as builders, draftsmen, planners, designers, are the first, the most essential unit in production—the Tool Engineers.

"Mr. Asmus, it is with pleasure that I now present you with the Charter of Chapter 44, American Society of Tool Engineers, and with it best wishes for a constructive year."

The assemblage joined in pledging allegiance to the flag and in singing the national anthem at the conclusion of the inauguration.

Assuming his office, Chairman Asmus introduced as appointees to committees: Constitution and By-Laws Chairman W. P. Connell, Ryan Aeronautical Co.; Editorial Chairman John E. Birdsall, Naval Air Station; Membership Chairman Roy M. Adams, Designer; Standards Chairman Manuel Klatchko, Asst. Supv. Tool Design; Public Relations Chairman Gerald R. Bradbury, Tool Designer; Education Chairman A. C. Arends, Tool Designer, Consolidated Vultee Aircraft Corp.; Industrial Relations Chairman J. B. Pennington, Tool Engineer, Ryan Aeronautical Co.; Program Chairman Paul H. Whitmoyer, Asst. Chief Tool Designer; Entertainment Chairman John C. Engle, Chief Tool Designer, Rohr Aircraft Corp., Chula Vista.

The technical program was presented by Max E. Tatman, Chief Metallurgist of Consolidated Vultee Aircraft. In his paper, "Present and Postwar Applications of High Strength Aluminum Alloys," Mr. Tatman explained the various strength values of the new alloys. After an "age hardening" process, consisting of a six-hour soaking at 350°, alloys with a consistent value of 75,000 pounds per square inch can be obtained, the speaker stated. He also commented on the saving of weight on railroad refrigerator cars and predicted the use of extrusions in the automotive field.

About 90 members and guests attended the meeting.

New Officers San Diego Chapter. Seated (left to right) Sherm C. Brunton, Second Vice Chairman; William F. Asmus, Chairman; Paul H. Whitmoyer, First Vice Chairman. Standing, in same order, J. E. Birney, Treasurer; and J. J. Groff, Secretary.

Naval Commander Returns To Industry

Chambersburg, Pa.—Commander R. E. W. Harrison has rejoined the Chambersburg Engineering Company as Vice-President in charge of sales, following his release by the Secretary of the Navy to an inactive duty status after four years of active service.

R. E. W. Harrison

During his last tour of duty, Commander Harrison served as a special assistant to the Under-Secretary—under the direction of Admiral H. G. Bowen. As Deputy Officer in charge, he supervised for the Government the former Remington Rand Bombsight Plant at Elmira, New York, and the Howarth Pivoted Bearings Company Plant in Philadelphia. At the conclusion of this tour of duty, he was presented with a Presidential Certificate of Satisfactory Service.

Commander Harrison's first tour of duty with the U. S. Navy, starting July, 1940, was as Contracting Officer for Machine Tools and Plant Equipment, in which assignment he executed the Navy's policy in expanding and modernizing the Navy Yards and Naval Stations.

A World War I veteran with four and one-half years' active service, and a lifelong machine tool engineer as plant manager, designer of precision grinding equipment, patentee and sales engineer, Commander Harrison originated the American technique of Surface Quality Control while Director of Engineering of the Grinding Machine Division of the Cincinnati Milling Machine Company—this latter activity eventuating in the setting up of the U. S. National Standards of Surface Quality. Immediately prior to joining the Chambersburg Engineering Company as Vice-President in 1935, he served the U. S. Department of Commerce for two years as Chief of the Industrial Machinery Division.

Commander Harrison, who has been affiliated with Central Pennsylvania and Potomac Chapters, is well-known in ASTE circles as a technical speaker and as the author of engineering articles published in *The Tool Engineer*.

Surmounts Misfortune To Become Engineer

Buffalo, N. Y.—Another example of the ingenuity and resourcefulness characteristic of a Tool Engineer is related in the *Buffalo Courier-Express* story of Buffalo Chapter's Edward A. Messer who has overcome a physical handicap to pursue an essential war occupation.

Edward A. Messer

Carried under the heading, "Paralyzed Leg No Handicap In Tool Design," the article by H. Katherine Smith, herself handicapped by blindness since birth, reads: "Edward A. Messer, tool designer for Allied Production Engineers, puts in ten hours a day at war work despite his paralyzed right leg. His job is originating and making accurate drawings of tools to be used in the production of parts of planes. An additional contribution to the war effort is his consistent buying of War Bonds.

"Born in this city, in the Delavan-Grider section, Mr. Messer was stricken with polio at the early age of 18 months. As a result, his right leg is paralyzed. He is obliged to wear a brace on it, and to use a cane when walking.

Art His Hobby

"At the Crippled Children's Day School, Edward Messer completed eight grades in six years. Subsequently, he went through Hutchinson High School, from which he was graduated in 1937. At Hutch, he majored in art which now is his hobby. His artistic endeavors range all the way from religious pictures to sign painting, and include posters and wood-carving.

"He carves animals of every description and such quaint figures as Snow White and the Seven Dwarfs and Pinocchio. One of his favorite dreams is to own a small art shop in which he would sell his carvings. But that dream probably will yield to his alternative ambition: To go to college and take a degree in mechanical engineering.

"Through the Buffalo office of the New York State Rehabilitation Bureau, arrangements were made for Messer to take a three-year course in draftsmanship [and machine shop practice] at Technical High School. For a full year after his completion of that course in 1940, he was unable to obtain work. Throughout that year, he kept busy at home, continued trying to get full time work, and never lost hope. Since 1941, he has been associated with Allied Production Engineers.

"Not content merely to arrive on time, do his job well, and work overtime whenever asked, Messer takes advantage of every opportunity to gain knowledge about tools and airplane construction.

Also Works Evenings

"After a ten-hour working day, one would expect him to be tired; but usually, he works most of the evening. From time to time, he works evenings at a plastics plant in Tonawanda. Early in the winter, he made and sold 700 windshield scrapers. Occasionally, he takes over the cooking and prepares a dish of Spanish rice that has established his reputation as a culinary artist. His idea of a leisurely evening is an evening of wood-carving.

"Mr. Messer drives his car, equipped with a vacuum brake on the steering column, operated by hand. Every day, he takes two riders to work. He makes all repairs on his car himself. He takes a natural pride in his comparatively new car and the pleasant home at 300 Grider St., both of which he has earned. He and his parents, Mr. and Mrs. Adam Messer, share this home.

"Mr. Messer is active in the Alumni Association of the Crippled Children's School. He never passes up an opportunity to do what he can for his crippled former classmates.

"'It's a good thing for handicapped persons to get together now and then,' he said, 'because we understand one another's problems and can be mutually helpful.'

Music Among Recreations

"He plays the piano and saxophone, enjoys a game of cards with his co-workers nearly every lunch hour, goes to baseball games when he has time and listens to broadcasts of football games.

"'I'd rather listen to a football game than watch one,' he says.

"Here's Edward Messer's advice to a handicapped war veteran or any other newly handicapped young person:

"'You possess abilities or can develop skills that will enable you to earn a living. You yourself must discover or develop those abilities. No one else can do that for you. Keep trying until you make good, and, during the period of waiting, keep busy.'

"He is active in Buffalo chapter of the American Society of Tool Engineers and the Evangelical Lutheran Church."

COMING MEETINGS

BINGHAMTON — June 6, Arlington Hotel, Binghamton. Speaker: Mr. William J. Konicek, Ex. Assistant to Vice President George E. Emerson, Link Aviation Co., Binghamton. Subject: "Link Aviation Devices—Link Trainers. Demonstration.

BUFFALO-NIAGARA FRONTIER—May 17, Dinner 6:30 P.M., Meeting 8:00 P.M. Speakers: Mr. L. Grimshaw, Mill Metallurgist; Mr. R. P. Kells, Chief Service Engineer, Latrobe Electric Steel Co. Subject: "Characteristics, Handling, and Use of Tool Steels and High Speed Steels." Coffee Speaker: Mr. Don Hastie of Carborundum Co., Niagara Falls. Subject: "Standard Grinding Wheel Marking Symbols."

CINCINNATI—May 12, at the Hotel Alms, 7th Annual Dinner Meeting.

DAYTON—May 14, 6:30 P.M., at the Miami Hotel, Dayton. Speaker: Mr. Louis Polk, President, Sheffield Corp., Dayton. Subject: "The Position of The Tool Engineer in the Production Picture."

HAMILTON (Ont.)—May 11, 7:00 P.M., Royal Connaught Hotel, Hamilton. Speaker: Mr. J. P. Gill, Vice-President, Vanadium-Alloys Steel Co., Latrobe, Pa. Subject: "High Speed Steels."

MILWAUKEE — June 9, Dinner Dance at Marine Dining Room, Elks Club, Milwaukee.

NEW HAVEN—May 10, 8:00 P.M., George & Harry's Restaurant, Chapel St., New Haven. Speaker: Mr. Raymond Brown, Rockford Magnetic Chuck Co. Subject: "Magnetic Holding."

SCHENECTADY — May 10, 7:00 P.M., Turner Hall, Albany St., Schenectady. Speaker: Mr. Einar Almdale, Service Engineer, Carboloy Co., Chicago. Subject: "Milling of Steel with Carbides." Also, Mr. Elton Miottel, Gorton Machine Co., Racine, will present the film, "An Exact Duplicate."

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Close die by a quarter-turn from open position, in *either* direction. Handle is always in easy reach no matter where die head is positioned on machine.

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Merely lift the handle and chasers, mounted on blocks, slide out of grooves. From dull to sharp chasers is a matter of a few seconds—no screws to loosen or tighten—no change of precision.

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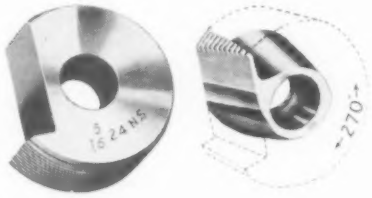
Namco Circular Chasers have proved their ability to produce more precision work. They eliminate trial cuts—the first piece is *production*—uniform precision insured throughout long runs.



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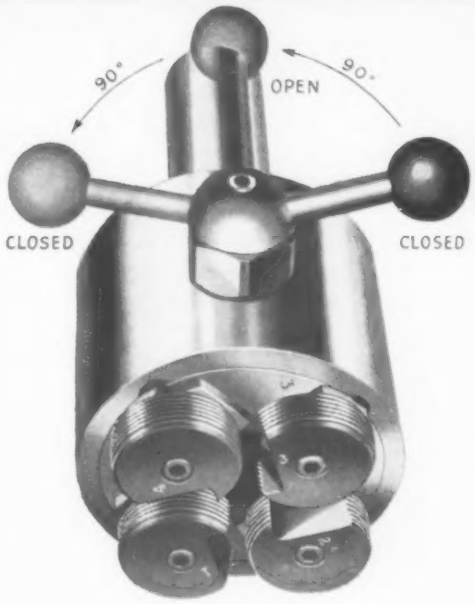

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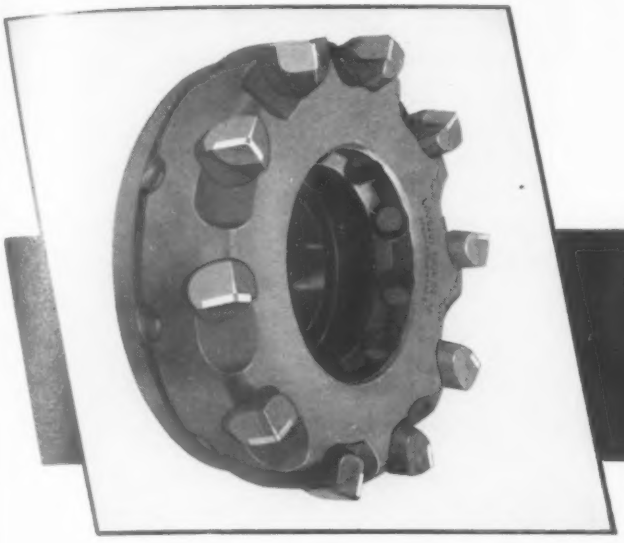

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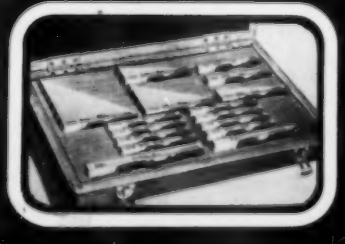
Set No. 38A–(Thin Blocks) $195.00
Set No. 38B–(Thin Blocks) $155.00
Set No. 14A–(Angle Blocks) $450.00



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SLOTTING

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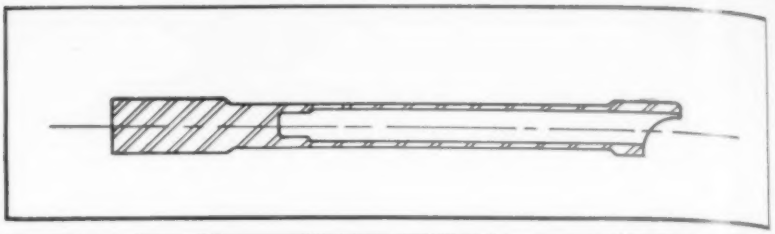
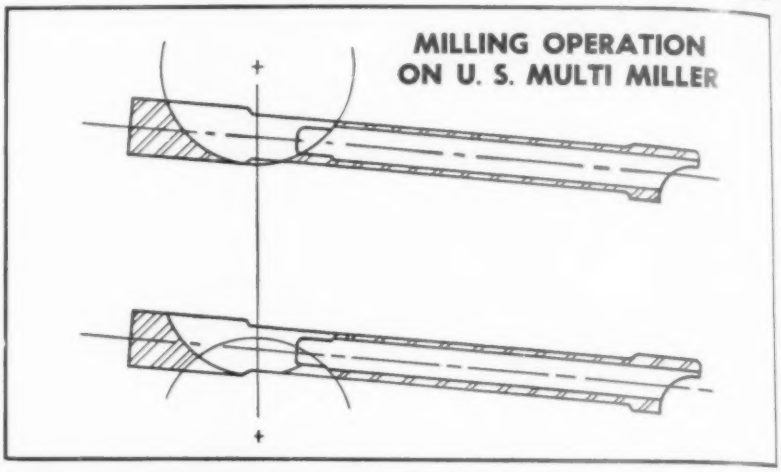
During the past few years, in many plants all over the country, standard types of machine tools have been adapted for the handling of an increasingly varied range of operations. In some instances machines have been observed handling jobs which in former years would have been considered impracticable.

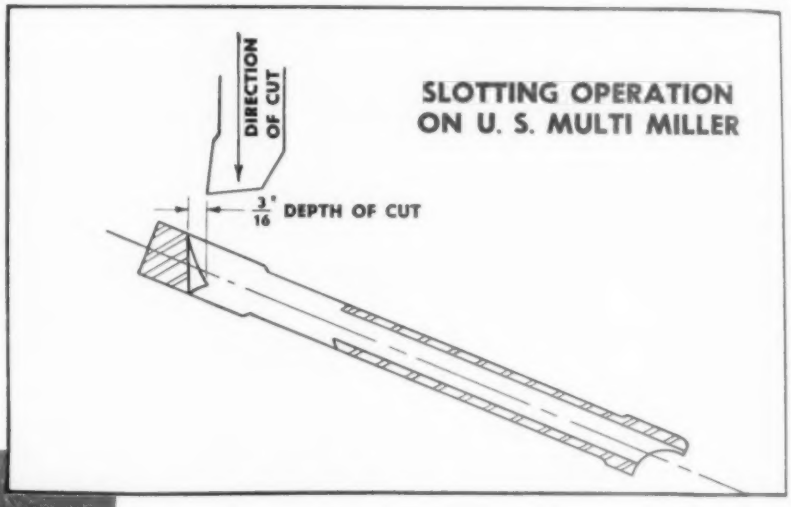
The illustration at the bottom of this page shows a U. S. Multi Miller equipped with a Slotting Attachment which has an adjustable stroke up to 2" maximum. At the right is a series of drawings showing the sequence of operations followed in machining the slot in the part shown below.

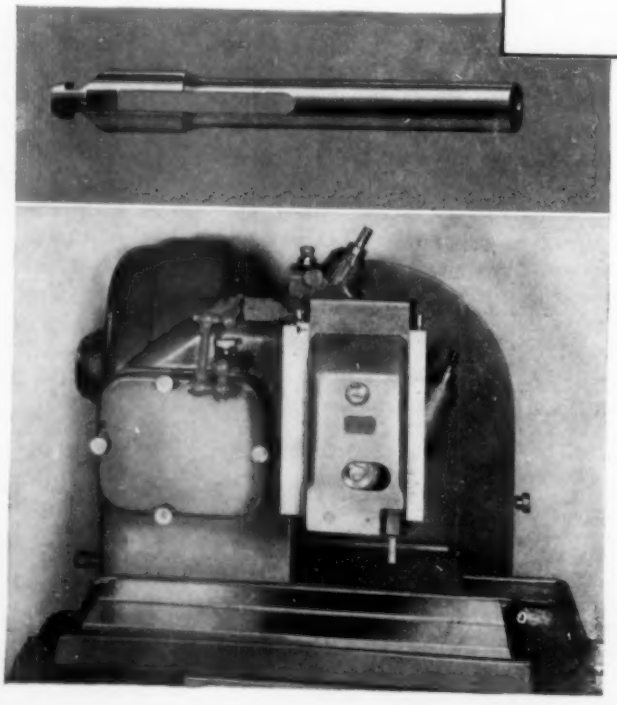
The upper drawing indicates the appearance of the work piece before the machining of the slot is started. The center drawing illustrates the preliminary milling of the slot. This operation is handled in two cuts on a U. S. Multi Miller equipped with indexing fixture. The slot is milled from one side; the fixture is indexed, and then the slot is milled from the other side.

In the lower drawing it will be seen that a portion of metal remains after the preliminary milling operation. To remove this material the U. S. Multi Miller equipped with Slotting Attachment and automatic vertical motion of the head is used. The cutting tool in the Slotting Attachment reciprocates in an "up and down" movement and the depth of cut is accurately controlled by the cam fed table of the Multi Miller on which the work holding fixture is mounted. At the extreme depth of cut the forward motion of the machine table is automatically stopped; the entire head of the machine (cam controlled to operate in synchronization with the table) lifts and clears the cutting tool from the work. The table then returns rapidly to starting position. The piece is then removed from the fixture, a new piece is loaded, and the cycle is repeated.









This is just one of the many varied types of operations which can be handled to advantage on the U. S. Multi Millers. Our General Catalog AM contains complete specifications for these machines. Ask for your copy.

▼

U. S. TOOL COMPANY, Inc.

AMPERE (EAST ORANGE), N. J.

▼

BUILDERS OF U. S. MULTI MILLERS—U. S. MULTI SLIDES—U. S. AUTOMATIC PRESS ROOM EQUIPMENT—U. S. DIE SETS AND ACCESSORIES

SUPER-SAW

Best for NON-FERROUS metals

MAGNESIUM • ALUMINUM • COPPER • BRASS
BRONZE • ZINC • LAMINATES • PLASTICS • WOOD

DoALL Buttress
REG. U. S. PAT. OFF.
THE NEW WIDE-SPACED, HARD TOOTH SAW

Breaking all records in war plants today in speedier, smoother shaping of the new light metals, plastics and plywoods.

Facing a big future because DoALL Buttress is the only saw that tackles and cuts these tough, new materials successfully. ***Requires no Resharpening.***

Available for immediate delivery from our supply points. Comes in various widths and pitches to fit any modern band sawing machine.

ALUMINUM RISER RINGS
120 sq. in. per min.

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80.40 sq. in. per min.

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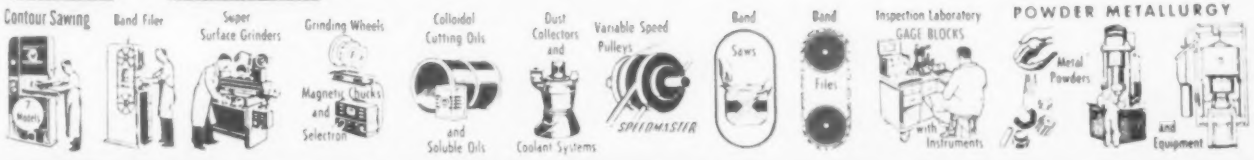
78 sq. in. per min.

Send Us Your Tough Jobs

Have you a sawing problem that's hard to lick? Let our research engineers put it through our laboratory and give you a written report on the saw and speed that give best results.

Write for Circular about the sensational performance of the DoALL Buttress Saw



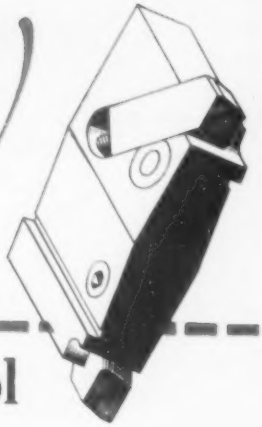
DoALL

INDUSTRY'S NEW SET OF TOOLS

THE DoALL COMPANY
234 N. Laurel Avenue — Des Plaines, Illinois

Sales & Service Offices: Baltimore, Birmingham, Boston, Chicago, Cincinnati, Cleveland, Denver, Detroit, Erie, Grand Rapids, Hartford, Houston, Indianapolis, Los Angeles, Milwaukee, Minneapolis, New York, Orlando, Philadelphia, Pittsburgh, Providence, Rochester, Rockford, St. Louis, San Francisco, Seattle, Syracuse, Toledo, Tulsa.

new



Block Type Boring Tool

This quick detachable cutter block provides self-centering, positive locking, quick inserting of block in boring bar and easy removal, without the aid of locating holes or screws, keys, wedges or taper pins.

The block containing the fully adjustable blades is simplicity itself. Made to engage both sides of the precision ground flats on the bar it quickly and accurately centers itself. When located, the cutting thrust pressure is evenly distributed against the back and bottom of the slot.

This new tool combines quick change, positive drive and accuracy. Greater rigidity is assured because the bar is free from centralizing screw holes.

HOW IT WORKS: To Insert Block slip block through the slot in the bar until the projecting lugs engage the ground flats on the bar. It is then perfectly centered. Snap in spring clips which hold the block in place and effectively seal the unit from dirt, chips, etc.

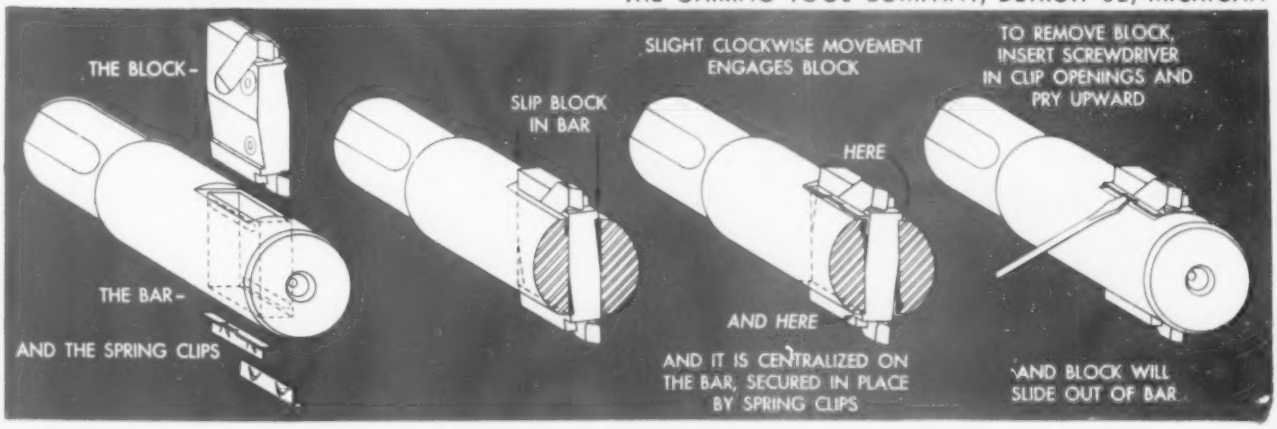
To Remove Block flip out clips, disengage the contact surfaces and withdraw the block.

Blocks can be reversed in bars for inverted operations.

Write for our illustrated folder describing these tools in detail.

GAIRING

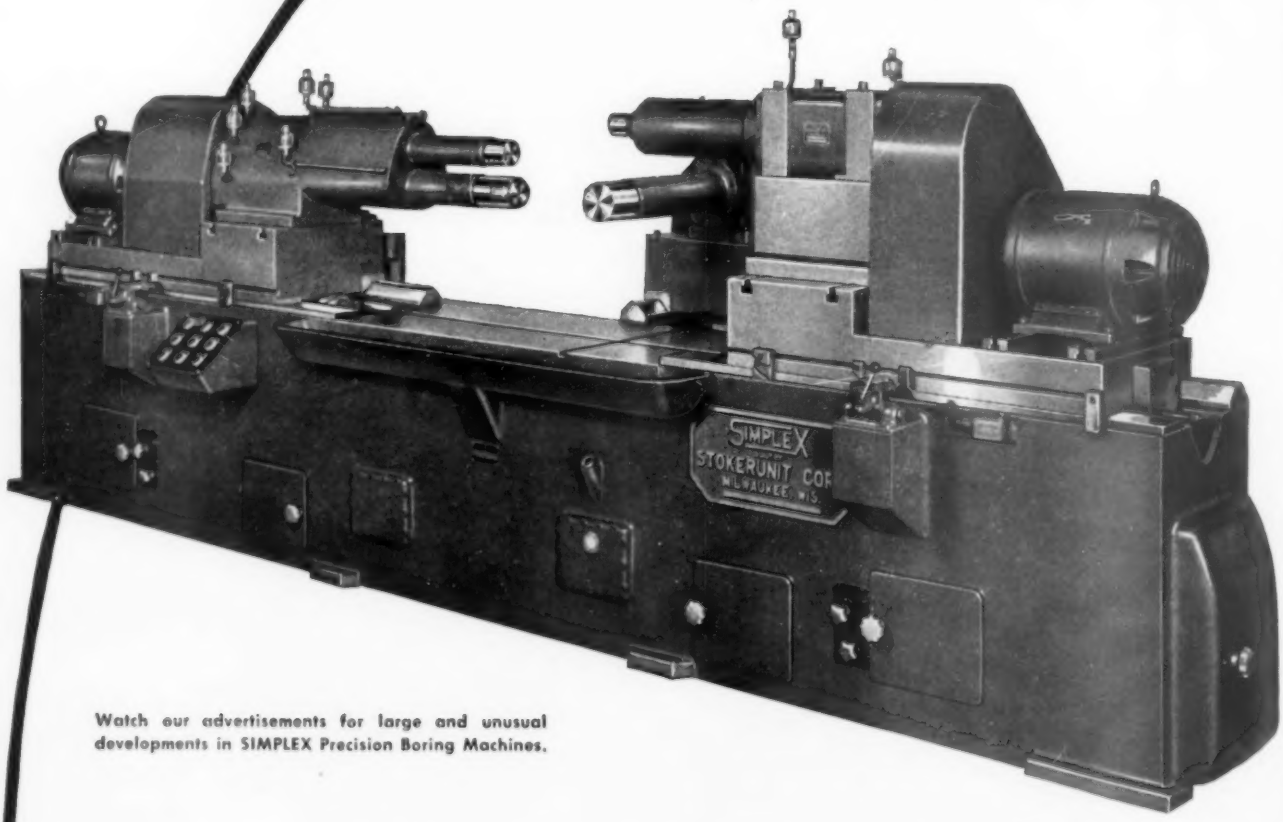
THE GAIRING TOOL COMPANY, DETROIT 32, MICHIGAN



SIMPLEX

When a leading tractor manufacturer contracted to build a transmission for a military tractor, they realized they could not take any chances with Government inspection. A SIMPLEX 3U 3-way Precision Boring Machine, large enough to bore a unit 4' long, made a quick and easy job of getting them out swiftly — and right!

The transmission case was approximately rectangular, 48" long, 19" wide and 21" high. There were six bores, ranging from 2¾" to 6½". Most of them were located so deep in the casting that extension type spindle heads were necessary. With this arrangement there was very little tool overhang, accuracy was easily maintained, tool life increased, chatter avoided.



Watch our advertisements for large and unusual developments in SIMPLEX Precision Boring Machines.

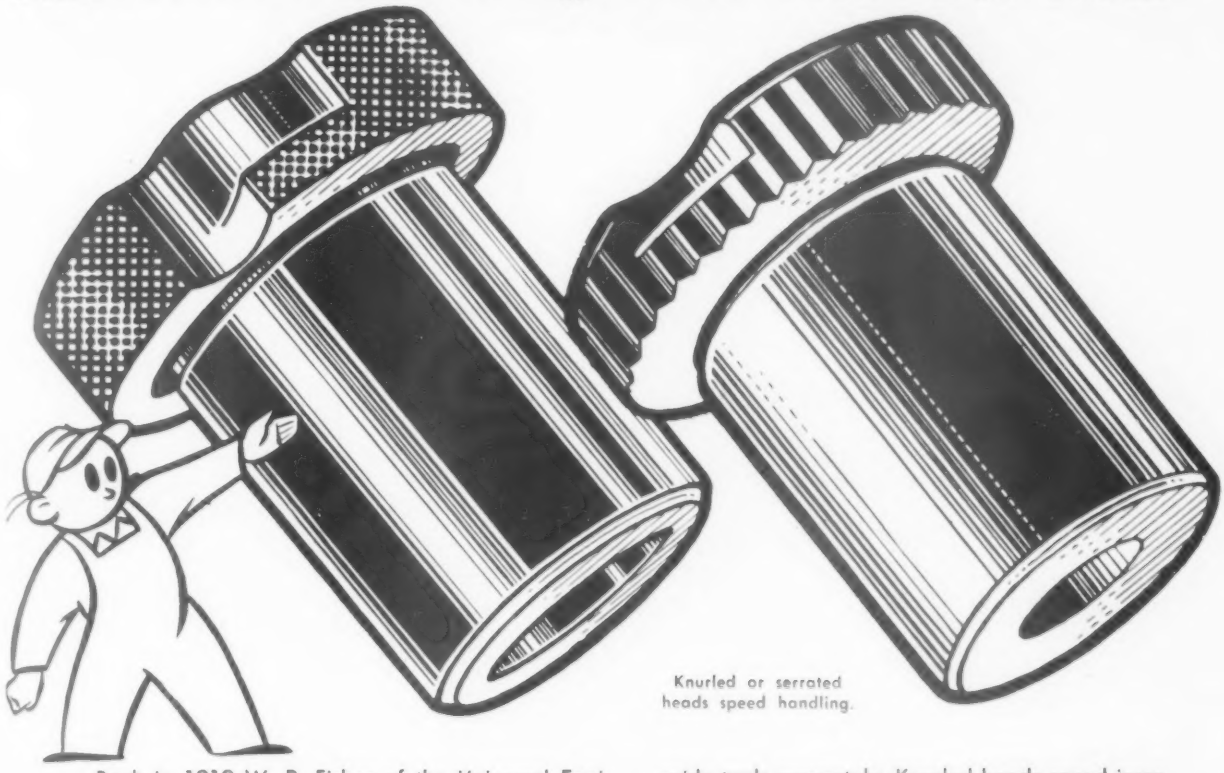
Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Precision Boring Machines and Planer Type Milling Machines

4528 West Mitchell Street, Milwaukee 14, Wisconsin

Universal Drill Bushings Save Drills and Tools

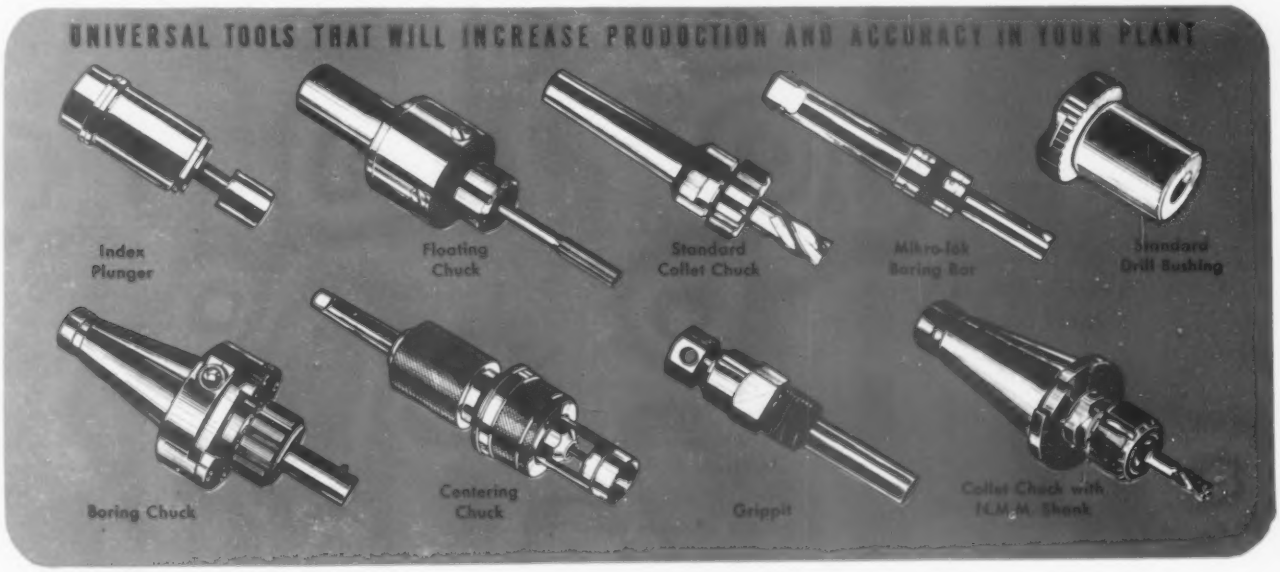


Knurled or serrated heads speed handling.

Back in 1919 W. R. Fisher of the Universal Engineering Co. originated the idea of standard drill bushings. Today, 26 years later, these bushings are saving countless manufacturers thousands of dollars by reducing drill-breakage and insuring more accurate drill, ream, and tap work.

Universal drill bushings are made of hardened, high quality steel with unexcelled resistance to wear through friction and galls caused by chips. Their super-finished bores, straight and round, guide tools accurately. Knurled heads speed insertion in and removal from jigs.

Universal drill bushings are made to the exacting standards of fine workmanship which has made the Universal Engineering Company a leader in the production of quality tools. Write today for complete information on Universal drill bushings, Mikro-lok boring bars, standard collet chucks, or any of the other superior Universal tools illustrated on this page.



UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH, MICHIGAN — Fighter Plane Given by Employees — 20% Employee Bond Deductions

THREE definite advantages are yours when you use Plan-O-Mill's exclusive Offset Head for external thread milling.

1. Lower cutter cost.
2. Longer cutter life.
3. Better cutting control.

With Plan-O-Mill's exclusive Offset Head you can use a small, solid, low-cost cutter to mill external threads over 1½" in diameter. Shown above is a typical application.

Plan-O-Mill is a high production machine for internal and external threading and form milling. It is fast, accurate and economical, producing work of exceptional finish. General Electric Thy-mo-trol gives separate and complete control of feed-in and feed-around—enables one operator to handle two or more machines.

For war or postwar production, turn now to Plan-O-Milling. Ask your machinery dealer for details or write direct.

Five Firsts

1. First to install General Electric's remarkable new Thy-mo-trol electric feed control!
2. First planetary to mill external threads with standard multiple thread cutter!
3. First planetary to coordinate feeds and speeds!
4. First to provide absolute control of feed-in!
5. First to offer a practical, low cost carbide thread milling cutter!

THREAD AND FORM PLAN-O-MILL MILLING MACHINES

PLAN-O-MILL CORPORATION

1511 E. EIGHT MILE ROAD • HAZEL PARK, MICHIGAN

THREAD AND FORM PLAN-CO MILLING CUTTERS

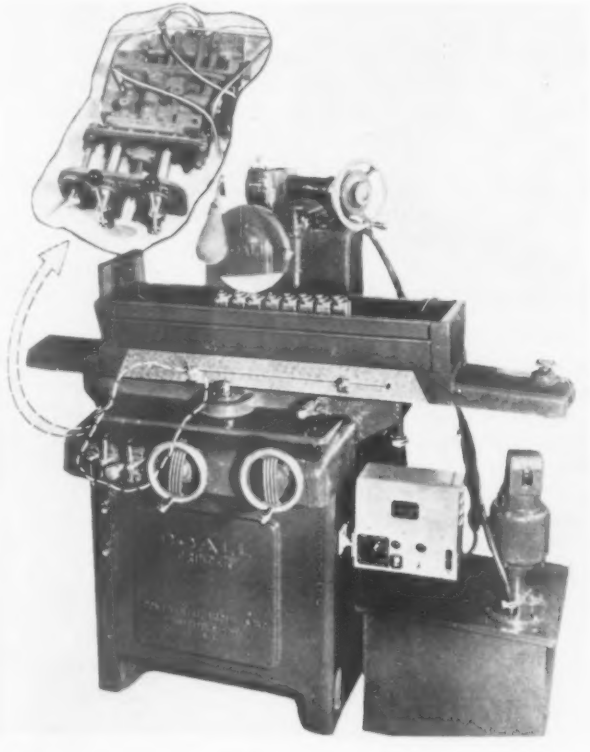
TOOLS OF TODAY

DoAll Five-in-One Valve for G-10 Surface Grinder

CONTINENTAL MACHINES, INC., presents the 5-in-1 Hydraulic Valve, which has been incorporated in the DoAll G-10 Surface Grinder. This machine, which is said to grind a surface to within 6 micro inches, has been designed to meet today's demands for increased speed, efficiency, simplicity of operation, and greater accuracy.

That the function of the new valve be thoroughly understood, one must first consider the requirements to be met by a modern surface grinder. In this connection, the DoAll G-10 has a variable table travel of 0 to 50 ft. per minute. Reversing action, operated by a pilot valve, is cushioned for smooth, life long performance. To insure this smoothness of action, two valves are necessary:—(1), a table control valve and (2) a table reversing valve.

The cross-feed action (which indexes at the end of the reverse travel) is actuated by a hydraulic cylinder in which settings are controlled, through an infinite range—from .004" to .200"—to suit the work being done. In addition to hydraulic operation, the traverse or cross-feed is also operated by an accurate screw, located in the center of the cross slide ways. Cross-feed, then, can be held to "split tenths" for close work —as for form and tool grinding—where manual feed is desired.



When, however, it is desired to use automatic cross-feed for sharpening dies or for grinding other flat surfaces, the cross-feed screw or manual drive is disengaged by a hydraulic cylinder. As a result, the cross-feed screw "gets a rest," thereby maintaining its accuracy longer.

To obtain the several essential motions, three components are required:

(1) Selector valve, which has three positions—A, manual cross-feed, B, automatic cross-feed and, C, wheel dressing or rapid traverse. This valve operates independently of the table action, which in turn can be automatically or manually operated. The cross-feed, for flat or form tool grinding, can be automatic or manual as desired. Rapid traverse may be used for wheel dressing and for moving the work up to the wheel after being chucked.

(2) Cross-feed control. This valve is used to control the amount of cross-feed, or, within the .004"—.200" range previously stated, for indexing at each table reversal.

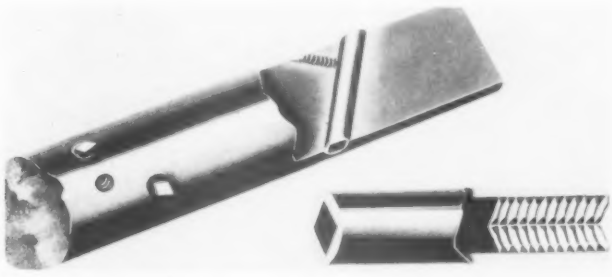
(3) Cross-feed directional valve. This valve, which has a "neutral" for stopping the carriage—for work loading, etc., while in the automatic position—is used to control direction of cross-feed. Also serving as a limit stop, it is used as a bypass when using the manual feed. Adjustable trip dogs provide for setting the cross movement to any amount of travel; this provision prevents the wheel from running into shoulders or other obstructions.

Complete information on this new precision grinder, with its "5-in-1" hydraulic valve, may be obtained from the manufacturer—Continental Machines, Inc., 1301 Washington Ave., Minneapolis 4, Minnesota.

Pre-Broached Square Holes

A NEW METHOD for putting square holes—as for standard size tool bits—into boring bars has been developed by Sturdy Broach Company, 13414 Fenkell Avenue, Detroit 27, Michigan. In this procedure the holes are pre-broached in a round steel sleeve, one end of which is tapped for a backing and adjusting screw.

To install, one merely drills and reams a hole, in the boring bar, to the correct outside diameter of the shell, and at the desired angle. The adapter may then be brazed, sweated or welded in place. That done, one or more set screw holes can be drilled and tapped through the boring bar and the insert.



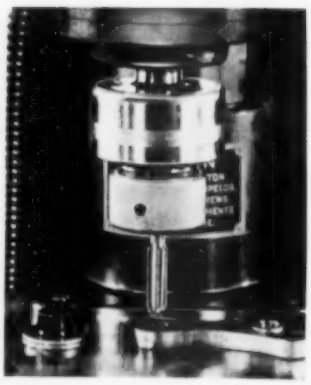
Obviously, the method effects a considerable saving compared to tedious hand filing and even to broaching of the solid bar. The adapter offers a further advantage in that it can be replaced, should the square hole become damaged, also, the sleeve can be pre-hardened which simply means fitting before brazing or sweating into place. The Sturdy Boring Bar Adapters are available for ¼", ⅜", ½", ⅝" and ¾" bits. They may be had finished, to standard sizes, or .015" may be left on the O.D., for grinding, as desired.

"Detroit" Tapper

As A Pat Example of savings effected by modern tools—*the Tools of Today*—Flint Manufacturer's Service Company, Flint, Michigan, has stepped up tapping of retraction levers for 50 caliber machine guns 180 per cent. In addition, rejects have decreased proportionately while tap life, despite the fact that the work is done by unskilled women operators, has been extended by 25 per cent.

The operation involved is the tapping of a $\frac{7}{16}$-20 NS thread $\frac{3}{4}$" deep, in tough S.A.E. 1050 steel forgings, to a Class 3 fit. Each part has one tapped and one reamed hole. The machine used is a "Detroit" Light Duty model LTM-16 tapping machine, provided with a lead screw. The machine is the product of Detroit Tap & Tool Co., Detroit, Michigan.

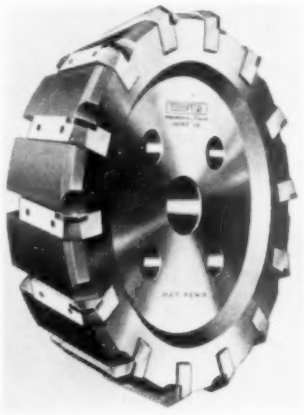
With tapping speed 400 RPM, an hourly production of 450 pieces per machine—or three times the previous output— has been consistently maintained. This is equivalent to floor to floor time of 8 seconds per piece. Largely, this production increase is due to the precision control of the tapping, which in turn permits the use of simple, non-clamping fixtures since there is no need of holding the work on the return stroke.



Locating pins on the simple platen fixture facilitate positioning of the workpiece and render clamping unnecessary. Loading and unloading is considerably expedited because of a .010" float in the fixture; this, together with floating tap holders, makes centering "automatic." As a result of this "dual float," tolerances are compensated for and the top follows the hole true and without end play through the complete cycle of tap, return and stop.

Besides producing smoother and generally superior threads, this method has practically eliminated rejects due to lead errors. This accuracy is due to the unique lead-screw drive of the *Detroit* machine, in which power take-off is between the screw and the spindle. This permits the lead screw to act as a lead guide only without being subjected to tapping strains. As a result of overall simplification, skilled operators previously employed on the job, were diverted to other and more intricate operations, while the tapping of the retraction levers was satisfactorily handled by unskilled women.

"TUNGTIP" Milling Cutters



Taking into consideration the various factors involved in modern milling practice—as rigidity in the machine tool itself, the fixtures, clamping and especially in the cutter—engineers of the *Tungtip Tools Division* of Lowell & Grayson, Monrovia, California, have developed milling cutters especially suitable to the characteristics of tungsten carbide.

The inserted tooth milling cutter shown consists of carbide tipped inserted teeth rigidly locked into the body without evident extraneous parts. The inserts have precision ground flat backs and serrated front faces, which assure uniform clamping pressure over their entire lengths. This rigid locking maintains the blades in correct position regardless of cutting pressure.

Tungtip inserted-tooth milling cutters are made in two styles—face and half side mill styles. The bodies are of alloy steel, accurately counterbored and ground on the back for adaptation to the spindle nose of the miller. The halfside mill has arbor holes and hub faces accurately ground.

The inserts are adjustable, by means of a simple yet ingenious backing and adjusting screw mechanism, to within .003"; this obviates rough grinding. To reduce maintenance costs, the carbide faces of replacement inserts are finish ground, with the cutting edges rough ground. Both types of cutters are available with carbide teeth ground with corner angle (as per illustration) or they may be had with 90° corners for milling to a shoulder.

"BMC" Lock Wrench

The BMC Wrench, made by Botnick Motor Corporation, Binghamton, N.Y., is a versatile tool of many uses—or, as the makers put it, "a whole kit of tools in one." Designed for plier grip—toggle action that exerts a gripping power of a ton, it combines the functions of pipe wrench, straight duty or ratchet pliers, clamp or vise.

The jaws, which are adjustable, remain parallel within the range of opening, which is from 0 to $\frac{3}{4}$". A calibrated scale indicates width of opening, which is adjusted by a conveniently located nut. Created by *tool engineers*, the BMC pressure lock wrench is said to answer the need for a tool that will do the most with the least effort.

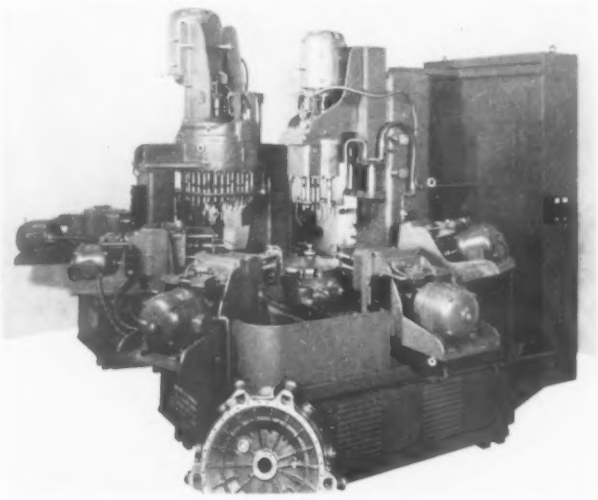
Automatic Multi-tapper

Designed and built by Snyder Tool & Engineering Co., Detroit, the automatic-cycle, special purpose machine shown above taps 61 holes, of various diameters and in various positions, in an aircraft housing.

Tapping is done in two passes. With the part located and clamped, with the fixture slide in neutral position, the starting button sends the slide to the left, under a multi-spindle tapping head. Here, several horizontal and angular tapping units operate simultaneously.

This cycle completed, the slide moves to the right, where a second group of horizontal, vertical and angular heads taps the remaining holes. All tapping spindles have individual lead screws.

Several of these tapping units are installed on an hydraulically operated sub-slide, thereby providing rapid advance of the entire unit before lead screw tapping. For example, the



vertical head, left hand station, has no hydraulic advance for a group of spindles on the periphery. However, the spindle cluster in the center of the head is automatically advanced, into tapping position, several inches lower than the outer spindles.

The design is quite clearly shown in the photograph, the fixture being shown in loading position, with a typical part in the immediate foreground.

Stacking Type Storage Bin

As a late development in the material handling field, a stacking type storage bin, manufactured by Palmer-Shile Company, 790 So. Harrington Street, Detroit, has unusual features. For one thing, 4-way entrance adds to flexibility in trucking and placing in position.

Corner plates allow for convenient stacking and storage; this feature, together with the angle iron corner reinforcements, adds to safety inasmuch as the load is taken directly on the corner angles, not on the metal sides. The bins can be tiered with crane, hand or power lift or fork trucks as desired.

While originally designed for a large metal working plant, the bins suggest a very wide use throughout industry for the handling of small parts in the course of production. Further details can be had from the maker.

Cemented Carbide Dies

Product of Carboloy Company, Detroit, cemented carbide dies are showing remarkable performance on the deep drawing of cores for radio tubes. Where, previously, runs of 100,000 pieces per die had been considered good, output with the cemented carbide dies has soared to 750,000 pieces—severalfold their estimated life.

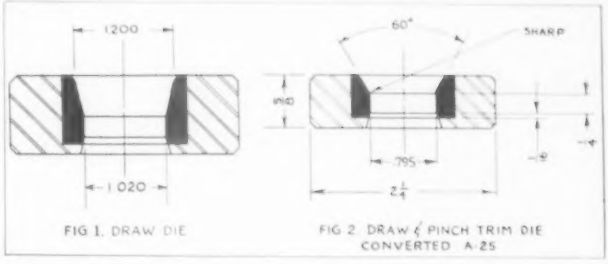


FIG 1. DRAW DIE

FIG 2. DRAW & PINCH TRIM DIE CONVERTED A-25

The material being drawn is .011" to .012" thick tin plated steel, blanked into discs 2-$^{9}/_{16}$" dia. and cupped in two operations, producing a cup 1-$^{5}/_{32}$" O.D. x 1-$^{1}/_{8}$" high. This is then drawn through the carbide die shown in Fig. 1, making the O.D. 1.020" and height 1-$^{1}/_{2}$". A second draw, through die shown in Fig. 2, produces a shell having a diameter of .795". Here, however, the draw angle is not blended, but is cut to a 60 degree included angle for pinch and trim. The cup is then finish drawn to size .795" x 1-$^{11}/_{16}$" high and with a .010" wall thickness.

On the 1.020" diameter, some of the cemented carbide dies have run as high as 750,000 pieces, while the .795" dia. dies have produced over 100,000 pieces to date and are still producing. It is of interest that the change over to carbide dies was made within a week, with all presses equipped with stock Carboloy dies that, where necessary, were modified or converted.

New One Piece Fastner

An Ingenious one-piece fastener assembly that makes blind fastening a very simple process, has been developed by the Simmons Fastener Division of Simmons Machine Tool Corp., Albany 1, New York. Called the Spring Lock Fastener, the device requires no nuts, receptacles or lock washers. All that is required are specially pierced holes in the mating parts of a sheet metal assembly.

Within its range, the fastener is self-adjusting to various thicknesses of sheet metal. It locks and unlocks with successive quarter turns—i.e., the first quarter turn puts the twist in the spring, the next clamps the sheets securely, and the following releases it and permits the sheets to be separated. It can, however, be installed as a permanent, blind or open hole rivet.

Held under tension, it cannot work loose from vibration, nor can it be distorted by reverse turns, since the head has a ratchet type slot that provides rotation in one direction only. It is capable of considerable load strain without deflection.

Further claims, as that its low unit cost and simple installation favor its use at a considerably lower installed cost than for other fastening methods, seem to be borne out in a 4 page bulletin, available on request.

Carbide Tipped Size Blocks

ANNOUNCED AS HANDI-BLOX by the maker, The Yankee Precision Products Co., a new type of size blocks makes its bow to Industry. Designed for use in the shop and on the production line, the blocks are available in sizes from ¼" to 4", and are accurate to within .0001". Smaller sizes are made of solid carbide, the larger blocks are carbide tipped.

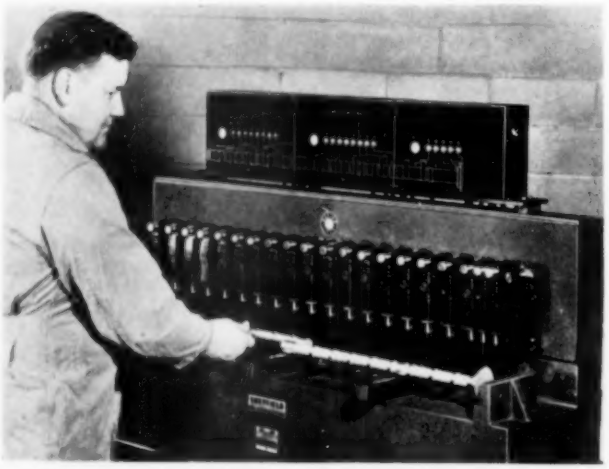
The HANDI-BLOX are not intended to replace ultra-precision gage blocks, but to supplement them with gages accurate enough for the general run of shop uses. Their initial low cost, and a long life insured by the carbide tips, make them a profitable investment. Further information may be had in a new bulletin, available on request by writing the makers at West Hartford 7, Connecticut.

Sheffield Multichek

THE MULTICHEK, developed by engineers of The Sheffield Corporation, Dayton 1, Ohio, is a precision gaging instrument designed for the rapid checking of multiple, outside diameters on shafts in one quick operation.

Each of the 21 individual Electrichek gage heads actuates a set of two individual signal lamps mounted behind a common port in the light case. Green and red lights, respectively, indicate diameters over or under the desired tolerances, with both lights off when dimension is within limits.

Largely built up from standard units, the instruments are adapted to special requirements or individual needs, and are intended for production gaging. Number of dimensions to be checked may vary from 2 to over 20, and once the instrument is set up, the inspector has merely to load and unload parts.

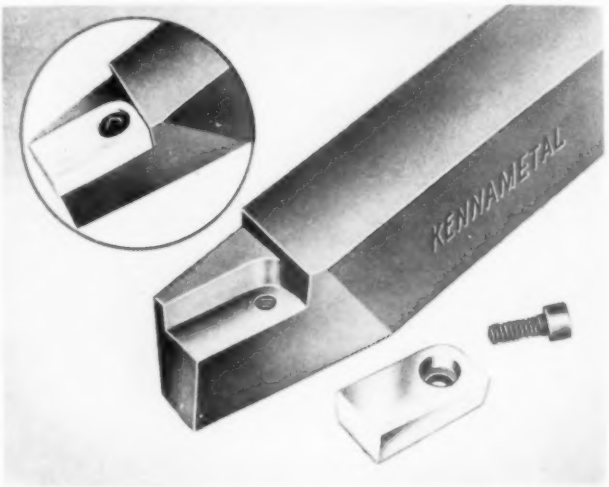


The simplicity of set up and operation is clearly shown in the photograph, where the operator is placing one half of a master gage in position. The other half is shown under the right bank. This application is for the simultaneous checking of 21 diameters on a camshaft, of which thirteen dimensions have tolerances of .005", six of .010" and the remaining two .001". The master gage is sectioned as a matter of convenience.

"Screwed-on" Tool Blanks

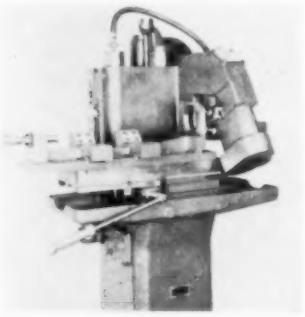
AS A NEW ENTRANT in the carbide tool field, Kennametal Inc., Latrobe, Pa., has developed a "screwed-on" tool blank which may be attached to a steel shank by means of a recessed-head cap screw. The screw, set in at an angle, merely serves to hold the tip against the walls of the recess, the latter resisting the main cutting thrusts.

The advantages claimed, outside of the elimination of brazing, are: greater durability in use and in grinding; simplified yet positive mechanical fastening, effecting a more consistent performance as compared to the usual brazed joints; independent grinding of shank, as a result of the removable tip; and streamlined design with no projection beyond shank cross section. And, since most shops are better equipped to drill and tap holes than to braze, the "screwed-on" tips simplify tool making with opportunity to heat treat shanks for greater resistance to heavy cuts. Last but not least, inventories are reduced since tips of different Kennametal grades can be interchanged on the same shank.



These blanks are now available in several of the larger sizes, with formed clearance angles, RH or LH, and in all standard grades of Kennametal. Complete tools of various styles—straight edge, lead angle, offset, etc., can now be furnished with the screwed-on tips, or separate standard blanks will be supplied to those who wish to make their own tools. Blanks of non-standard shapes and sizes having this feature may also be had for special tools, such as are used in shell turning, form cutting of radii and grooves, etc.

Multi-Spindle Notching Machine



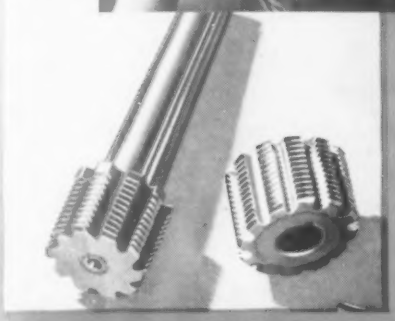
A NEW SPECIAL arrangement, to be adapted to the K.O. No. 1-M Hand Milling Machine, has been placed on the market by Kent-Owens Machine Company, Toledo, Ohio.

Designed for the simultaneous milling of staking notches in rockets, shells, adapters, and similar parts, the device consists of three spindles, each carrying a cutter and equally spaced around the shell diameter.

The shell is located in the bore shown near the cutter head, when a bayonet type clamp at the rear of the fixture provides quick clamping and release. Air operated fixtures are used for milling adapters; by either method, production is much higher than with previous notching methods.

Do it with DALZEN

Left: Dalzen taps, in U. S., Metric, Whitworth, and Special forms are precision ground of hardened high speed steel in a complete size range. TUNGSTEN CARBIDE TAPS — EITHER SOLID OR INSERT—A SPECIALTY.



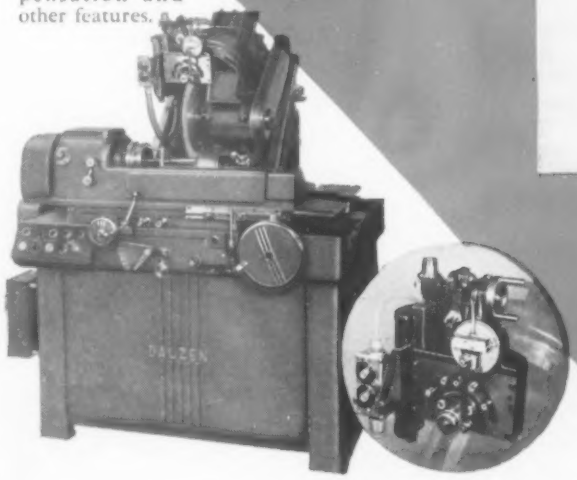
Left: High speed ground thread milling cutters, scientifically heat treated for longer cutting life.

Dalzen manufactures an extensive line of precision cutting tools, parts, thread grinding and special machines — engineered for maximum efficiency and economical operation. Each is the result of years of experience on the part of designers and craftsmen. These are reasons why, all over the United States and in many foreign countries, master mechanics who have used and worked with Dalzen-made machines and tools say, "You can do it better with Dalzen." Write for details on how Dalzen can "do it better" for you.

Below: Dalzen "2-in-1" combines a dependable, accurate center lapping machine with a sturdy drill press. Saves on equipment costs, floor space.

Below: No. 5 *Electronic* Thread Grinder. Easy to operate. High production efficiency and accuracy by controlled wheel speed, motor driven dresser, automatic compensation and other features.

Right: No. 2 Thread Grinder. Compact, upright design saves floor space. Simple to operate. Low first and maintenance cost. Ideal for short or production runs.



Right: Threaded parts are ground to close tolerances exactly to your specifications. Rigid inspection standards assure a uniform fine finish. Jobs requiring rolled or cut threads are also handled.

DALZEN

TOOL AND MANUFACTURING CO.

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Yes, it's true!

GEROTOR AIR CYLINDERS

ARE MODERNLY DESIGNED

Gerotor Model 10 Double-Acting, Rotating Air Cylinder

Gerotor Model 111 Double-Acting, Non-Rotating Air Cylinder

FEATURES

- ★ COMPACT DESIGN
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- ★ NO TIE RODS
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- ★ BALL-BEARING AIR SHAFT ASSEMBLY USED ON ROTATING CYLINDERS

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8 MODELS
12 DIAMETERS
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AIR AND HYDRAULIC DEVICES

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How consistent testing saves you trouble

BY subjecting every product to a series of tests before it leaves its factory, "CARBORUNDUM" saves industry an untold amount of grief. Uniformity of the abrasive means uniform wheel performance. Absence of flaws reduces down time in your shop. And these checks assure you that each product by "CARBORUNDUM" is the type of dependable abrasive tool you need for your job.

But there is still more involved in the production of good grinding wheels, coated abrasives and special products. It is equally important to get the particular abrasive combination best suited to the job. Your "CARBORUNDUM" Representative is the man to help you do that. And his efforts are supplemented by the knowledge of the "CARBORUNDUM" Abrasive Engineers. These are the men who have helped perfect a large share of the abrasive processes which have become standard. The Carborundum Company, Niagara Falls, New York.

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FOR EVERY ABRASIVE APPLICATION

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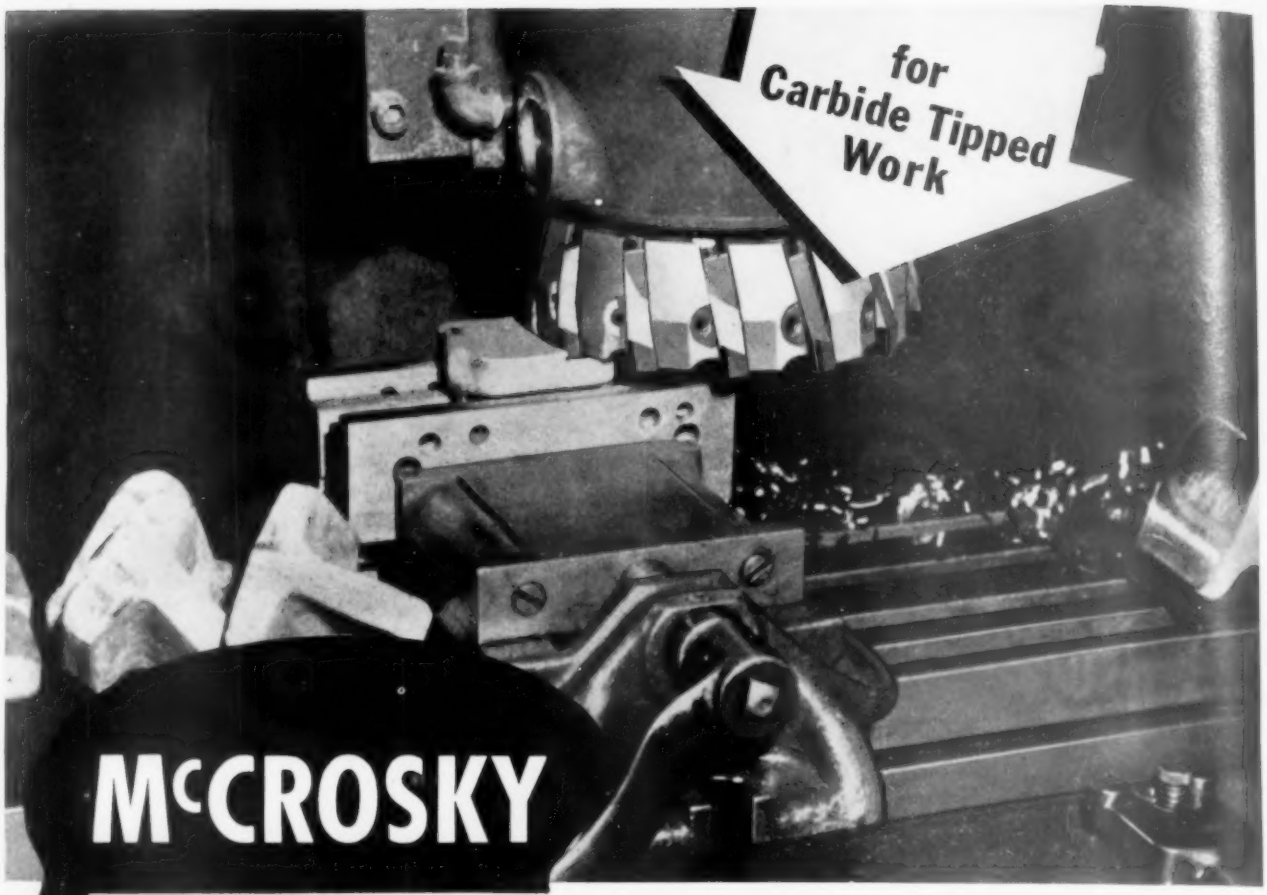
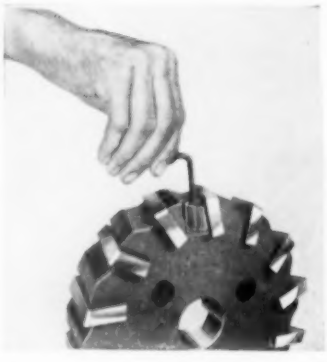


McCROSKY

*Jack-Lock MILLING CUTTERS

*PATENTED

Taking a ¼" to 5/16" cut in 4130 steel heat treated forgings, with spindle speed of 218 R. P. M., 14⅝" feed, and .0045" feed per tooth, this carbide tipped job demonstrates the advantages of McCrosky's Jack-Lock construction.



Conceived and perfected by McCrosky engineers, the Jack-Lock wedge gives inserted blade tools the strength and rigidity of solid tools,—yet permits easy and quick release of the blades without hammering, or accidental damage to the blades or the tool. Fine pitched screws in back of each blade assure accurate and uniform adjustment for regrinding, resulting in minimum blade loss,—more accurate and speedier regrinding—permitting a job to be kept in continuous production with fewer, sometimes only a single standby tool. Specify "McCrosky" for increased production and lower costs.

McCROSKY TOOL CORPORATION
MEADVILLE, PA.

COST CUTTING TOOLS

Designers and Manufacturers of

Jack-Lock MILLING CUTTERS

Block Type BORING BARS

Wizard CHUCKS AND COLLETS

Super Adjustable REAMERS

Turret TOOL POSTS

THE PATENTED

DUAL-SPIRAL REAMER

FINISHES MORE HOMES PER MAN-MINUTE

Set of six pictured (No. JR) sizes ½", ⅝", ¾", ⅞", 1", 1¼", range from .495" to 1.295". Set comes complete with pilots in fitted hardwood chest. Righthand flutes simultaneously, shearing mirror-smooth finishes in practically any metal or plastic. Alignment reamers made with extensions and follow-pilots of variable lengths. Prompt delivery!

- ★ 500% Greater Straight Line Expansion Range
- ★ Eliminates Honing
- ★ Replaceable Blades May Be Sharpened Up to 8 Times
- ★ Hand or Machine Types
- ★ Individual Reamers in Sizes ½" to 3-3/32"

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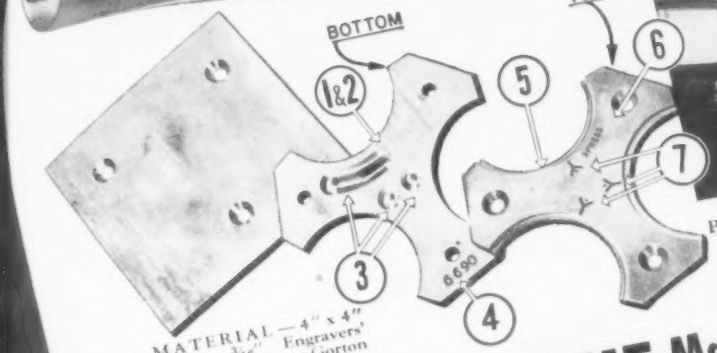
GORTON

SPECIALISTS FOR OVER 50 YEARS IN

Tracer-Controlled MILLING



MATERIAL—4" x 4" square, 3/16" Engravers' Brass, as it comes to Gorton Pantograph, with three holes drilled, countersunk.

PROFILING...SLOTTING...ENGRAVING, etc. *with Unskilled Operator*

Seven Operations on ONE Machine...from 1 Master

Showing VERSATILITY of GORTON PANTOGRAPH Tracer-Control . . .

ONE GORTON 3-Z PANTOGRAPH now performs work of several machines, eliminating various tools and fixtures formerly required—saving time and expense of separate machine set-ups and tooling.

SIMPLY BY CHANGING CUTTERS AND TRACING on both sides of a single, Flat Template (Master)—both top and bottom of this intricate part are completed within specified tolerances of ±.0025"—a total of 7 operations, in ⅓ previous time.

JOB IN BRIEF

PART—Indicator Plate.

7 OPERATIONS—(1) ROUGH MILL three arc sections...(2) FINISH-MILL sections...(3) MILL semi-circular groove and two 5/32" counter-bores...(4) ENGRAVE Part Number ...(5) Reverse Master and Part, PROFILE three U-shaped grooves along arc edges...(6) ENGRAVE word "SPREAD" and (7) ENGRAVE three Y-SLOTS to penetrate counter-bores.

CUTTERS—(only 4 needed)—Single Flute, straight-shank End Mills.

SPEEDS—Up to 9,200 r.p.m

ENGINEERING SERVICE . . . FREE

Find out how Gorton Tracer-Control Machines can pay for themselves in time and man-power savings like this in your shop...how they can perform multiple operations, freeing other machines for new work and increase production.

SUBMIT ANY PROBLEM—Send a sample part, prints, or specifications to your nearest Gorton dealer, or to the Gorton Factory at Racine, Wis. No obligation.

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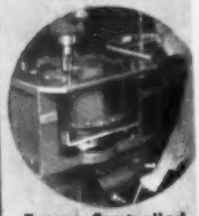
The *Right* Type of Machine for Every Job...
From 2 oz. to 2 ton DIE BLOCKS



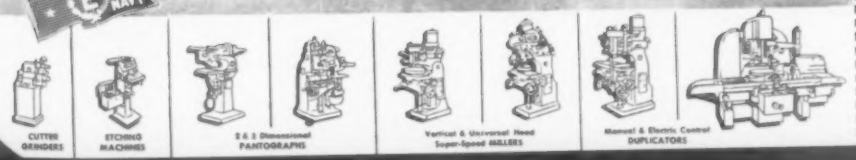
Tracer-Controlled MILLING

Tracer-Controlled DUPLICATING

Tracer-Controlled ENGRAVING

Tracer-Controlled ETCHING

GORTON Precision MACHINES



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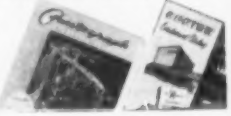

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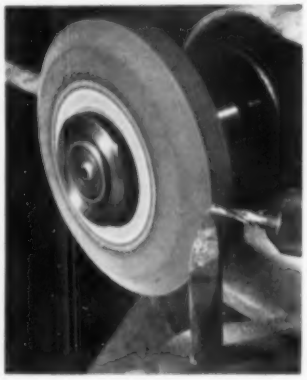
GADGETS

Ingenious Devices and Ideas to Help the Tool Engineer in His Daily Work

Special Grinding Wheel Cuts Time



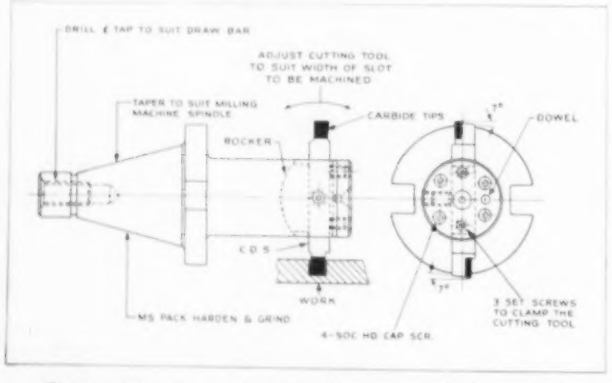
DEVELOPED BY Raymond A. Marvel, a craftsman in the Army Division Tool Crib at the Glenn L. Martin Company, Baltimore, a special grinding wheel steps up grinding of better primary and secondary clearances of one and two flute router bits from 12 bits per hour to about 35.

A 1" x 30° bevel is dressed off the side of the wheel with 1/64" at the periphery left flat. The remainder of the beveled surface was then contoured. In use, a finger is placed against the 1/64" flat portion, to positively set the desired clearance. The bit is then placed over the finger once, with the flat portion cutting the primary clearance, where the contoured edge leaves the secondary clearance smooth and symmetrical. The secondary clearance is controlled by the degree of contour.

Milling Adapter and Cutting Tool

THE ADAPTER AND Cutting Tool shown has been successfully used for milling .3125" slots, ½" deep, to plus .0003", minus .000, on mild steel castings. Its performance has been superior to that of conventional milling cutters, which soon dulled, when regrinding would make them undersize. With the Adapter Tool, production has been consistently high and all pieces within the required limits of tolerance.

A feature of this tool is its extreme sturdiness. Held directly in the spindle of a milling machine, there is little or no vibration. The cutting tool, which is carbide tipped on both ends, may be compared to a double ended lathe tool. In operation, one end cuts one side of the slot, the other, the opposite side. When dull, it is simply "rocked" on the rocker and reground, when original size is restored.

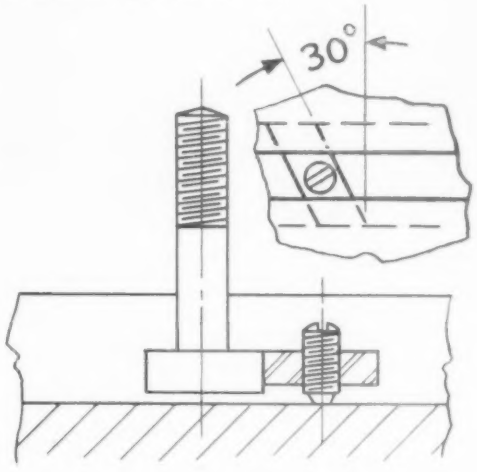


Construction is so obvious that no particular verbal description is necessary. Note, however, that the cutter being placed on center results in a shear cut, imparting a shaving effect; this, and the fact that it generates less heat than a conventional, commercial cutter, tends to prolong tool life. The Adapter can be used as well on a vertical miller, for machining radii or, if desired, for counterboring.

Frank J. Peragine, New York Chapter

Stop for Tee Bolts

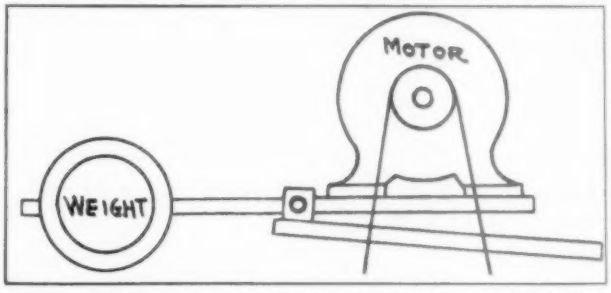
IT IS OFTEN desirable to provide stops in tee slots, to prevent tee bolts from sliding out. This is especially true in the case of vertical slots. While a very effective stop can be made from a standard nut (possibly reduced in height) and a set screw, this has the disadvantage that it can only be inserted from the ends of the slot.



On the other hand, the simple stop shown in the illustration can be slipped into the slot anywhere along its length, and automatically locked as the screw is tightened. Its width should be slightly less than the minor width of the slot, for easy insertion and removal, and the length (measured across at a 30° angle) the approximate width of the tee. It can be made from rectangular section C.R.S. bar, and cyanide hardened for sustained service.

W. F. Schaphorst, Newark, New Jersey

Pivot For Vertical Drives



WHEN PROPER BELT tension is maintained, vertical drives are entirely practical and efficient. The method illustrated shows one simple way to insure proper tension, and is so drawn that little explanation is required.

The weight need not exceed that of the motor. For that matter, the motor can be placed partially over the pivot thereby increasing leverage and shortening the arm. However, there is an advantage in the greater distance, in that there is a correspondingly greater up and down movement. Consequently, the belt will need shortening less frequently.

In operation, adjust the weight to suit, on the arm when the motor will be lifted against the load, maintaining the proper tension on the belt at all times.

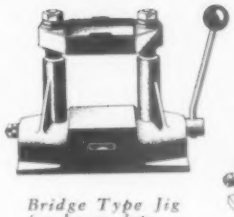
W. F. Schaphorst, Newark, N.J.

The New Woodworth "Cone-Lok" Jigs

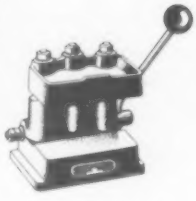
WOODWORTH "CONE-LOK" Jigs utilize the great braking power of perfectly mated male and female cones. This principle assures maximum locking effect in either direction. WOODWORTH "CONE-LOK" Jigs are rugged, have few moving parts, are more adaptable, have sealed-in lubrication, built-in safety and the mechanism is protected from chips.

Catalogue No. 45-J describing the sensational "Cone-Lok" principle is now available. *Write for your copy.*

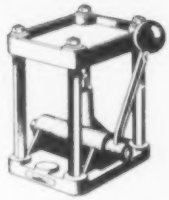
ACCURACY YOU W CAN TRUST



Bridge Type Jig for heavy duty.



All Purpose Jig for general machine shop work.



"Up-Clamp" Type Jig for close tolerance work.

The Jack-Lok, a special fixture clamp using the "Cone-Lok" principle for use in special fixture designs is available.

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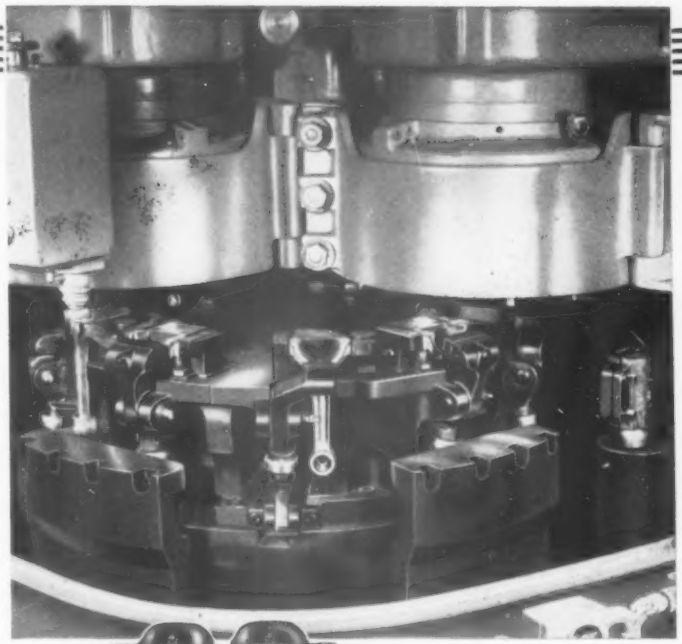
PRECISION GAGES • PRECISION MACHINED PARTS • PRECISION TOOLS

IF YOUR GRINDING PROBLEM IS

Small Pieces — **At High Production** — **To Close Tolerances**

use the HANCHETT 24-A2 . . .

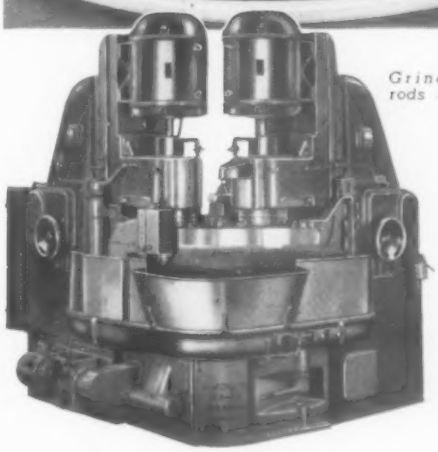


ALL IN ONE PASS!

In one pass, pieces are rough and finished ground, as well as automatically sized after passing each grinding wheel. Tolerances of + or — .0005 are easily maintained on continuous production runs at a savings over other finishing methods of as much as 500% and more.

The duplex head construction of the new Hanchett 24-A2 Automatic Rotary Surface Grinder raises the "small-piece finishing job" to higher production levels than ever before obtained.

Don't let machining operations boost your production costs out of line. Hanchett engineers will be glad to study your problem and offer constructive assistance.



Grinding automotive connecting rods and caps in one pass with one fixture set-up.

For further details See your nearest Hanchett Dealer or Write for Bulletin

Hanchett 24-A2 Automatic

144-TTE

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GRINDING WHEELS up to 3" in diameter in various bonds, including the new FV, the bond with a pedigree.

MOUNTED WHEELS in every practical shape, grain and grade, each firmly mounted on a steel shank.

TRY A TEST WHEEL — Write us what material you have to finish and size wheel you'd like. We'll send one promptly.

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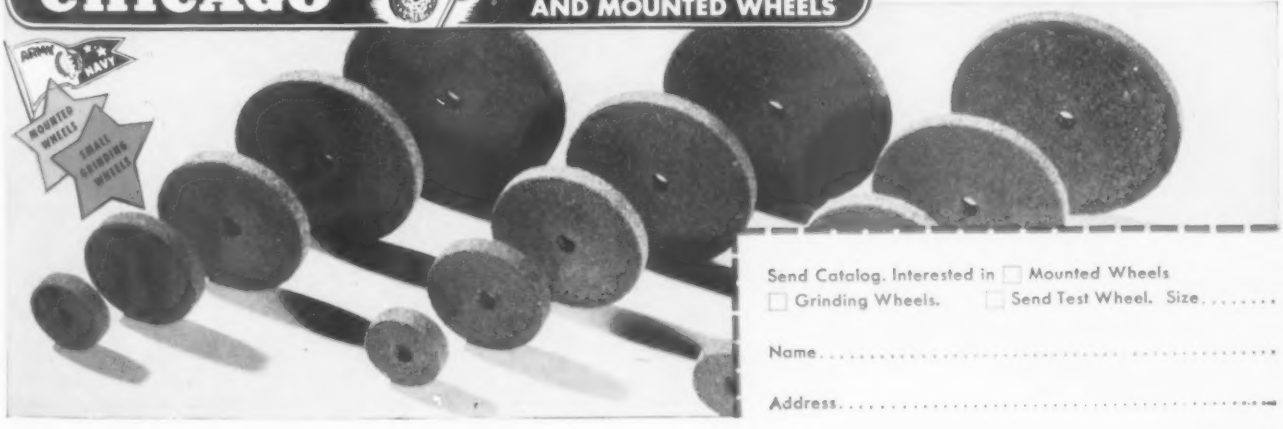

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Precision tools, like TAPS, call for particular care because of the nature of their cutting edges. They should be handled gently to avoid broken teeth. Regrinding should be done by experienced operators, as variations in uniformity of the cutting lands and teeth will produce poor threads, and shorten the life of the Tool.

Winter Brothers

COMPANY Wrentham, Massachusetts, U.S.A.

INFORMATION

that will help you..

get the best possible broach for *your particular job*

We believe that this book will be helpful to you in specifying exactly the kind of broaches you require. It will be sent to you without obligation on your part. Please make requests for copies on your company stationary.

In addition to the technical information contained in this U. S. Broach book, there are reproductions of 4-color Kodachrome photographs showing the various steps in the manufacture of broaches.

★ *We manufacture broaches, broaching fixtures, broach holders, splined gages and arbors* ★

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BROACHING TOOL

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GOOD READING

A Guide to Articles of Interest and Significance in the Trade Press

Smoke Bombs, by Eric Crawford, Editor, in February *Canadian Machinery*. An account of the techniques employed in the manufacture of smoke in the Dominion. Also, in the same issue, an editorial—"Can't tell it too well"—which is an excellent case for free enterprise.

Firepower. Numerous inquiries come into our offices, from members and others in the Armed Forces, on matters of Know-How relating to field service. But, willing as we are to co-operate with our boys, we feel that, being remote from the scene of action, our replies may be rather inadequate to the occasion. However, a magazine—*Firepower*—published bi-monthly by the Army Ordnance Ass'n, Mills Bldg., Washington 6, D.C., seems to have a lot of the answers. The February-March issue, for example, contains some rather pertinent suggestions along with pithy—and at times facetious—editorial matter. *Firepower* is free, to any Army Ordnanceman, for the asking.

Material and Process Selection, by E. P. Strothman in March 1st *Iron Age*. A paper, originally presented before the S.A.E. in Detroit, in which the relative importance of material and production methods are comprehenively discussed. Replete with excellent illustrations.

Forming Light Metals by the Guerin Process, by R. G. Paul in February *Western Machinery and Steel World*. Largely an expositional writing, the article nevertheless provides a very clear picture of a process of sheet metal forming that has played a considerable role in the mass production of aircraft.

Also, in the same issue: HYPERMILLING VS. HIGH SPEED STEEL MILLING, by Eugene L. Strawn. A short but comprehensive treatment of a recent phase in milling techniques.

No More Oil Mist in the Air, by John W. Smith in February *Factory Management and Maintenance*. A solution for one of the "big kicks" of industry—air in manufacturing departments surcharged with oil mist.

Also, in the same issue: COLOR IN THE PLANT, by Faber Birren. Showing the psychological effect of color harmony on workers, and its incidental boost in both morale and production. A *pioneer* story.

Cost Planning the Postwar Small Airplane, by A. G. Tsongas, chief engineer, and F. S. Macomber, industrial engineer, in March *S.A.E. Journal*. An article of wide application, to all industries, that co-ordinates the function of Product and Tool Engineering, Time Study and Cost Accounting with Production.

Some Thoughts on Postwar Threading, by C. W. Bettcher in February *Screw Machine Engineering*. An analysis of design, materials, tolerances, methods and conditions as they will affect screw products in the postwar era.

"Postgraduate Course for Gears" is the title of a new 20 page, 3 color, 8½" x 11" booklet published recently by Cone-Drive Division, Michigan Tool Company. The booklet, intended to be a source of suggestions for designers of new products in which right angle reduction gearing is to be used, records current wartime uses for Cone-Drive. This information, in turn, indicates other current and future application for which this type of gearing has been proven ideally adaptable.

By analogy and implication, the booklet suggests various types of service, as, for example, control gears of all types, winches and hoists, mining and similar heavy duty machinery. Also, applications to machine tools, presses, stokers, separators, etc., etc. In all, the booklet is a rather striking testimonial to the phenomenally increased use of Cone-Drive gearing, especially since the beginning of the war. This growth is mainly due to the great load carrying capacity of this gearing, in turn due to the continuous bearing of the teeth for the length of the worm. Copies of the booklet may be had by writing Cone-Drive Div. at 7171 East McNichols Road, Detroit 12, Michigan.

Manual of Broaching, an 88 page treatise devoted to the Art of Broaching and claimed to be one of the most comprehensive books ever written on this subject, has just been published by the Detroit Broach Company, 20201 Sherwood Ave., Detroit 12, Michigan. It is printed in two colors and in addition to information of interest to every manufacturing executive, contains 96 photographs and 54 drawings of broaching techniques and applications. Copies of the "Manual of Broaching" are available from Detroit Broach Company at $1.50 per copy.

You and the Returning Veteran. *A guide for foremen*, published by Allis-Chalmers Manufacturing Co. Forty pages, packed with psychologically sound approaches to one of the major problems now facing industry—the rehabilitation of war veterans. Available on request to employers or interested groups. Address Allis-Chalmers Mfg. Co. at Box 512, Milwaukee 1, Wisconsin.

"Gear Shaping and Shaper Cutters" is a striking 24 page technical bulletin (No. C-45) issued by Colonial Tool Company, Ltd., Windsor, Ontario. This bulletin, which is a sequel to "Hobs and Hobbing" (No. H-44) recently issued by Colonial, contains information of considerable value to all engaged in the mass production of spur and helical-gears.

Included in the contents are solutions to major problems in the shaping of accurate and therefore quiet gears, as well as information regarding effects of machine and set-up errors. Also discussed are desirable tooth forms, root fillets, the mating of hobbed and shaped gears, together with when to use the one or the other. For a clearer understanding of the principles involved, the process of generating by shaper cutter is pictorially illustrated.

In addition, the bulletin contains valuable information on correct set-up, checking, the sharpening of gear shaper cutters for best results, along with nomenclature of shaper cutter terms and a list of the essential terms to be included when ordering, to prevent errors and delays. The four basic types of standard, as well as the four "special" Colonial shaper cutters, used for roughing, semi-finishing and finishing, and available in disc, hub, tapered and straight shank are illustrated, together with charts of sizes available in standard cutters.

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. . . for gaging small holes

Wire type plug gages were originated by the Van Keuren Co. in 1925. They are now in almost universal use for gaging small holes.

Longer lasting precision and lower gage cost is assured because the entire 2" length of the gaging unit can be used. When the end becomes worn, it is ground off and a new section of the original accuracy is moved out for use. The wire unit is securely held in the handle by a split bushing and a headless set screw.

Van Keuren wire type gages are made to Class B accuracy, $\begin{matrix}+.00005'' \\ -.00000''\end{matrix}$ on the Go units and $\pm .000025''$ on the No Go units. Closer or wider tolerances can be supplied if desired.

Hard chromium-plated gaging units for use where the requirements are severe can be furnished at a slight additional cost.

The 160-page Van Keuren Catalog No. 33 gives full information on wire type plug gages and other precision measuring equipment. It also includes simplified formulas for measuring threads, splines, gears and worms. Your copy of this valuable handbook will be sent on request.

Wire Type Plug Gage Set No. 60. This set of gages provides accurate standards for checking twist drills in sizes from 1 to 60 (.228" to .040" diameter). A useful set of standard size gages. Price—$375.00.

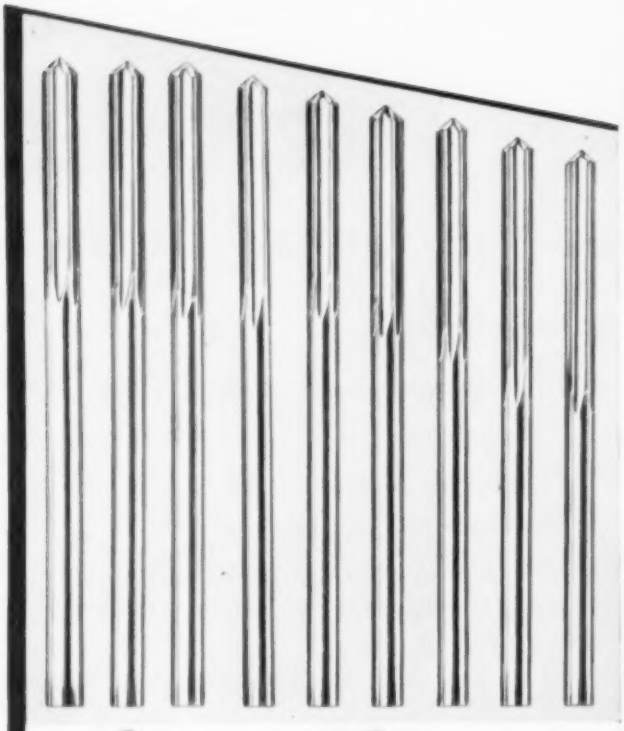
Van Keuren Wire Type Plug Gage Set No. 80 which includes drill sizes from No. 1 to 80 (.228" to .0135"), price $425.00.

Van Keuren

THE Van Keuren CO., 176 WALTHAM ST., WATERTOWN, MASS.

25th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles



Better Reamers are our Specialty

All the brains, all the skill, all the facilities at Lavallee & Ide are directed toward one aim — a better small reamer.

We're making it now in the L & I Ground Flute Reamer which is more accurate, smoother cutting, and longer lived by far than ordinary milled flute reamers, yet *costs no more.*

Grinding the flutes from solid, hardened, high-speed steel bars, and giving super-careful attention to the finish of the cutting surfaces are secrets of L & I superiority.

Because we specialize, we can deliver from stock fractional size Machine Reamers by 64's from $\frac{1}{64}$" to $\frac{3}{16}$", and wire gage sizes from 1 to 60, as well as Taper Pin Reamers from 7/0 to #4.

Bring us your reamer problems. You'll get better results because we're "Specialists in Small Reamers."

LAVALLEE & IDE, INC.
CHICOPEE, MASSACHUSETTS

L&I GROUND FLUTE REAMERS

- Carbide tools retipped and ground to your specifications.
- High Speed Tools reconditioned.
- 33 years of experience behind us and a nation-wide reputation for integrity, responsibility and dependability.
- We do uniformly good work, on purpose. Tool salvage is not an expense— It is a profit.

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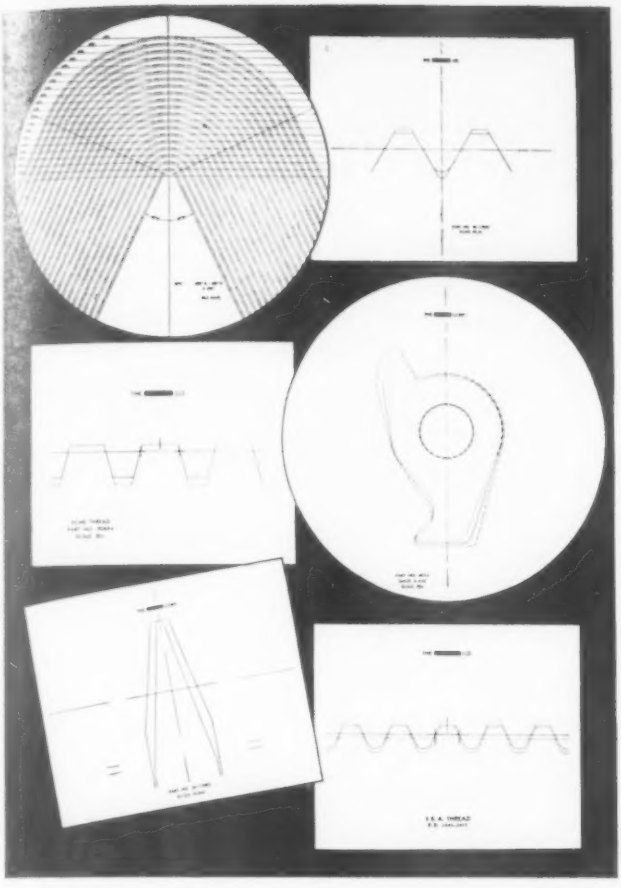
National Tool Salvage Company

6511 Epworth Blvd. Detroit 10, Mich.



Optical Comparator Charts

made to

Your Specifications

They enable you to solve inspection problems, for they are as easy to use as a ruler and are 10 to 100 times as accurate.

Above are a few of the many Comparator Charts we have made to specifications supplied to us by exacting engineers.

This valuable service is available to you. With Universal Comparator Charts you can save time and money—and get precision inspection on your optical comparators.

Precisely made, they stay that way, for they are produced on dependable selected plate glass.

Your request for estimates or information regarding our services will receive prompt attention.

ENGINEERS SPECIALTIES DIVISION

of UNIVERSAL ENGRAVING & COLORPLATE COMPANY, INC

980 ELLICOTT STREET
BUFFALO 8, NEW YORK

TWIN PLANTS

1919 EAST 19th STREET
CLEVELAND 15, OHIO

THERE'S A PIONEER PUMP FOR YOUR JOB!

IN FACT there's a PIONEER Pump for virtually EVERY job . . . . because there are 400 standard models in the great PIONEER Pump family. And they are the "longest-lived" pumps ever built . . . . with rugged dependability built right into every one of them.

PIONEER Pumps were designed by a group of machine tool engineers . . . . men who knew the importance of having a dependable and constant flow of coolant for the very machines which they were designing. As a result, PIONEER Pumps are doing a day-in and day-out job on busy production lines everywhere.

PIONEER MODEL "VS"
(VERTICAL SHORT)

This model is designed for use in shallow tanks or chip pans without covers. The pump grille can rest directly on the bottom of the pan—and, if necessary, without clamping or holding brackets. The outlet boss may be specified assembly 90° or 180°.

When you have a pumping problem . . . . remember PIONEER . . . . the name that means the answer to all pumping problems.

400
Standard Models to Choose From

PIONEER Pumps
HIGH EFFICIENCY • LOW POWER CONSUMPTION
GREATER VOLUME AND LESS MAINTENANCE

Pioneer Pump & Manufacturing Co.
19645 JOHN R ST. • DETROIT 3, MICHIGAN

ALLEN FLAT HEAD CAP SCREWS

set up *flush* in holding thin plates or superposed parts, without weakening the metal with deep countersink.

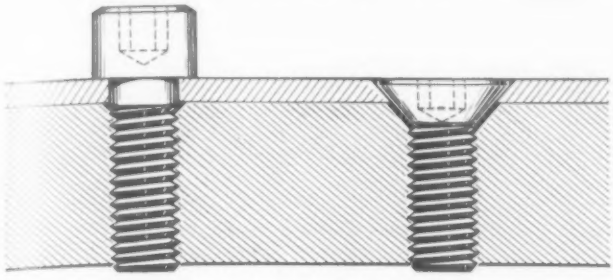
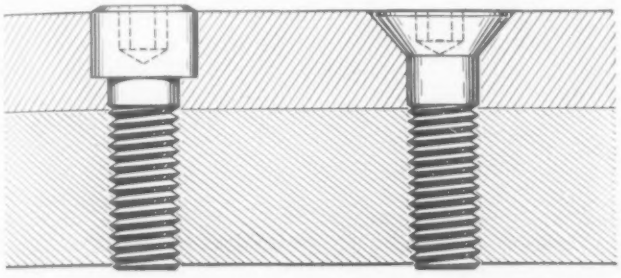


Figure 1, above, (right) shows flush surface achieved in tieing down metal piece thinner than head height of screw.

Figure 2, below, shows advantage in fastening relatively thin plate to retain flush surface without weakening the metal with deep countersink. Note more binding surface under head.



ALLEN USAGE

Here's the way to apply ALLEN holding-power to comparatively thin plates where a flush top surface must be achieved, with no gap between screw head and surrounding metal.

Note that top piece of metal in Figure 1 is thinner than head height of the Flat Head Cap Screw. There's more binding surface under the head than is the case with a projecting-head screw, and the angle helps lock the screw in place by drawing down on a conical surface.

Figure 2 shows application in a comparatively thicker plate. Here the flush surface is retained without weakening the metal with a deep countersink. Maximum strength in the screw itself is assured by "pressur-forming" of special-analysis ALLENOY steel.

Your local Allen Distributor will supply you with samples to try out these signal advantages of our Flat Head Cap Screws. Ask him or write us. Engineering data on request.

THE ALLEN MANUFACTURING COMPANY
HARTFORD 1, . . . CONNECTICUT, U. S. A.

Front Idler Bearings Machined at Caterpillar Tractor Company

National Tools are the Shapers of Progress

Broaches • Herringbone Cutters
Slitting Saws • Counterbores
Reamers • Gear Shaper Cutters
Gear Cutters • Milling Cutters

Circular and Flat Form Tools
Hobs, Ground and Underground
Special Tools

FROM BLUEPRINT TO PRODUCT

The mighty products of the Caterpillar Tractor Company are playing an important part in many fields of war. They are bulldozing through to victory.

The production of front idler bearings—which are machined on the machine pictured above — is approximately one hundred pieces per hour, and there is a tool life of approximately six hundred and fifty pieces per grind. The photograph shows National Tool's broach inserts at work in this operation.

NATIONAL TOOL Co.
11200 MADISON AVENUE CLEVELAND, OHIO

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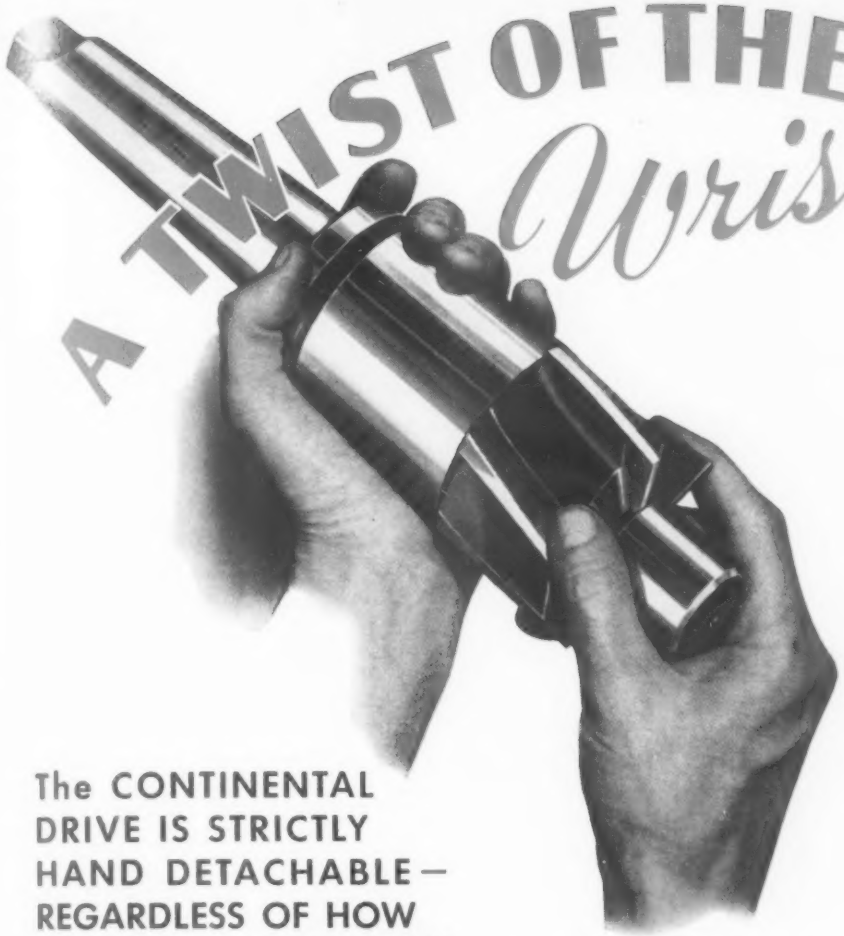
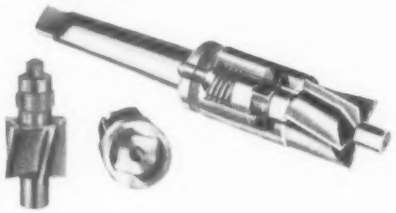
A TWIST OF THE *Wrist*



The CONTINENTAL DRIVE IS STRICTLY HAND DETACHABLE—REGARDLESS OF HOW SEVERE THE OPERATION HAS BEEN



With an ever-widening range of practical uses, the Continental Counterbore is proving a favorite standard cutting tool in all types and sizes of machine shops. Of rigid and simple construction, with patented features, it has long been outstanding in American industry. There's a reason: Note in illustration at left the Continental indestructible drive. It is composed of two driving lugs formed on the cutter shank, with two corresponding abutments on the inside of the holder. There is an aligning bearing above and below the driving lugs that brings the cutter and holder concentric, and prevents the cutter from being forced out of alignment. The cutter and holder are engaged and disengaged by revolving the cutter a quarter turn by *hand*. No tools or equipment are necessary.

CONTINENTAL TOOL WORKS

CTW

EX-CELL-O CORPORATION

Continental

CUTTING TOOLS

- Boring Bars and Tools
- Broaches
  Broach Pullers
  Broaching Fixtures
- Core Drills
- Counterbores and Countersinks
- CTW Drive Holders
- Counterbores (Tool Room Sets)
- Counterbore Pilots
- Inserted Blade Cutters
- Carbide Tipped Cutters
- Form Relieved Cutters
- Milling Cutters
- Thread Milling Cutters
- End Mills
- Side Mills
- High Speed Steel Reamers
- Carbide Tipped Reamers
- Shell Reamers
- Inverted Spotfacers
- High Speed Steel Tool Bits
- Carbide Tipped Tool Bits
- Circular Form Tools
- Cut-off Tools
- Flat Form Tools
- Dovetail Form Tools

45-46

CONTINENTAL TOOL WORKS

Division of Ex-Cell-O Corporation

DETROIT 6, MICHIGAN

HOLO-KROME

fibro forged SOCKET SCREWS

√Completely Cold Forged

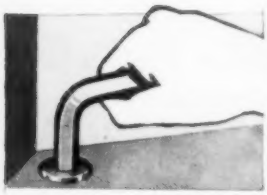
√ EXCLUSIVELY HOLO-KROME

GUARANTEED UNFAILING PERFORMANCE

is the Holo-Krome assurance to users of H-K FIBRO FORGED Socket Screws—the Completely Cold Forged Screws . . . The advice and counsel of Holo-Krome Fastening Engineers is of concrete value to them in speeding their present production schedules and in planning for tomorrow. GUARANTEED UNFAILING PERFORMANCE plus Holo-Krome Quality and uniform accuracy are some of the reasons why they specify "HOLO-KROME"... Yes, users like Holo-Krome Socket Screw Products!

THE HOLO-KROME SCREW CORP.

HARTFORD 10, ... CONN., U. S. A



SOCKET SCREWS

INTERNAL WRENCHING . . .
QUICK AND POSITIVE TIGHTENING . . .

The BETTER Fastening Method

PRECISION INSPECTION AND MANUFACTURING

The Sheffield Corporation has provided industry with a broad line of precision gages and instruments for the dimensional control of manufactured mechanical parts of all kinds. These include the Visual Gage, Precisionaire, Multichek, Electrigage, Electrichek, Internal and External Measuring Instrument, Thread Checking Instruments and Automatic Gaging Machines. Only a few of these are illustrated here.

FOR THE MANUFACTURE OF PRECISION THREADS AND FORMS

The Micro-Form Grinder provides the most economical method of grinding both flat and circular form tools from carbides and steels. Precision forms and threads are most accurately produced in a shorter time, often by plunge grinding, on the Precision Thread and Form Grinder with a crusher dressed multi-ribbed wheel. These machines can also be used in making crusher rolls for dressing surface grinder wheels.

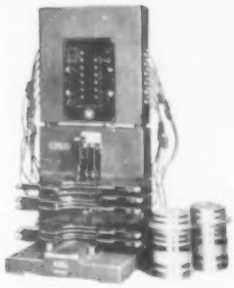
SHEFFIELD CONTRACT SERVICES

As one of a very few American manufacturers producing both machine tools and precision inspection equipment, Sheffield is excellently prepared to coordinate both quantity and quality production. In this connection, Sheffield serves many manufacturers on tooling programs and maintains a large staff of expert tool engineers. Sheffield offers the combined services of both the tool engineering department and the manufacturing department or either individually.

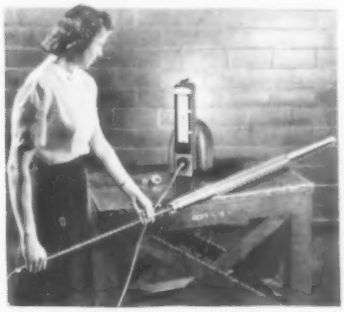
Contract production for other manufacturers include also precision threaded parts, form tools of all kinds, sub-assemblies and complete assemblies.

WRITE FOR ENGINEERING DATA

VISUAL GAGE, available in six amplifications, for checking external dimensions both in process and final inspection. Angularity of surfaces, angularity between a surface and a bore, surface run-out, pitch diameter of screw threads, internal dimensions, and other critical conditions can be checked with the use of standard and special accessories.



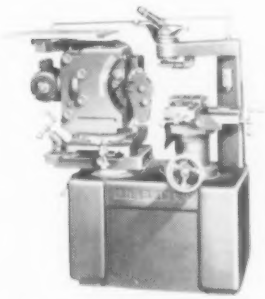
SHEFFIELD MULTICHEKS inspect from 2 to 20 and more dimensions (both upper and lower limit) simultaneously in one operation. Savings in time, floor space, inspection and production costs normally offset the cost of a Multichek in from 6 to 12 weeks.



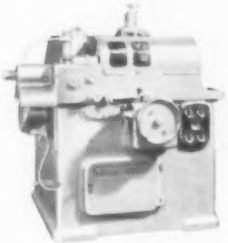
THE PRECISIONAIRE is a flow-type air gage for measuring internal and external dimensions, bell mouth, out-of-round and average diameters of through, blind and step holes. It checks both GO and NOT GO limits in one pass very much faster and with 10 to 40 times less gage wear than can be done with fixed size gages. The human element of error does not enter.

THE SHEFFIELD INTERNAL - EXTERNAL MEASURING INSTRUMENT with Electrigage.

TYPE C AIRSNAP for checking external dimensions.



THE SHEFFIELD MICRO-FORM GRINDER grinds any flat or circular form tool, profile work or wheel crusher rolls to an accuracy of .0003" directly from a 50 to 1 layout drawing—no template required. It saves up to 75% in machine time over conventional methods, especially on carbides.



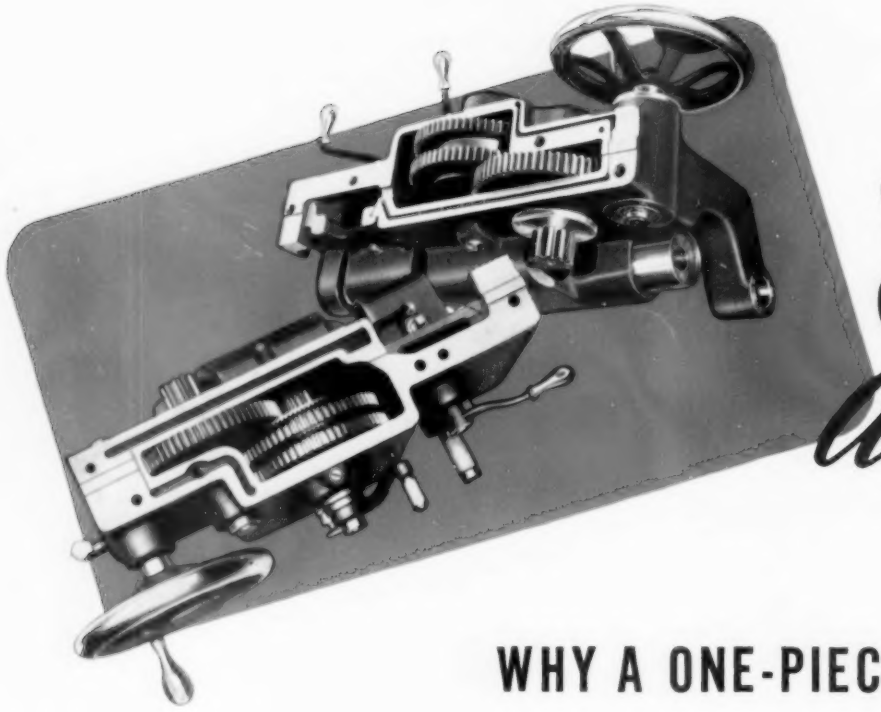
This is the SHEFFIELD PRECISION THREAD AND FORM GRINDER using the amazing crusher roll method of dressing a multi-ribbed wheel for the production of threads or forms by either plunge or traverse grinding. Can also be used as a conventional single point grinder.

Multi-ribbed wheel, crusher roll and work part.

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES



TURNING QUESTIONS *Answered*

WHY A ONE-PIECE APRON?

Because the one-piece construction assures the utmost in efficiency and accuracy of operation. That is why LeBlond Lathes are equipped with one-piece, double-wall aprons. Between these double walls the rack-pinion, the rack-wheel and the hand-wheel stud are mounted from the inner side on anti-friction bearings . . . no bolted-on brackets or supports to work loose. This rigid construction maintains accurate alignment under the excessive strains of high speeds and heavy cuts. At the same time, it assures both easy movement in operation and unit compactness. It is lubricated by a positive "one shot" oiling system. The one-piece apron is another outstanding LeBlond feature.

LEBLOND FIELD ENGINEERS ARE AT YOUR SERVICE to help you in your development work, particularly along the lines of the difficult, the "out of the ordinary" turning problems. The accumulated knowledge of every manufacturing trend in good times and bad—peace and war—gained over a period of nearly 60 years from thousands of installations all over the world, is yours for the asking. Contact our nearest dealer or write Department FE 46.

Since 1887

the world has been turning to LeBlond for turning equipment.

WRITE FOR CALALOG

ARMY E NAVY ★ YOUR BONDS BUY BOMBS ★ BUY A "BLOCK-BUSTER" TODAY!

THE R. K. **Le BLOND**

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CHICAGO 6, 20 North Wacker Drive, STA 5561

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES